U.S. Army Corps of Engineers
Omaha District

Final Technical Project Planning Memorandum
Camp Adair/Adair Air Force Station
FUDS ID F10OR0029

Site Inspections at Multiple Sites, NWO Region Formerly Used Defense Sites, Military Munitions Response Program

Contract No. W912DY-04-D-0010
Delivery Order No. 003

July 21, 2006

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Final Technical Project Planning Memorandum

Site Inspection
Camp Adair/Adair Air Force Station
Formerly Used Defense Site
FUDS ID F10OR0029

Military Munitions Response Program

Documentation for Technical Project Planning Meeting
Holiday Inn Express, Corvallis, Oregon
April 5, 2006

Hosted by U.S. Army Corps of Engineers

Prepared by Shaw Environmental, Inc.

July 21, 2006

Concurrences

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TABLE OF CONTENTS

ADMINISTRATIVE INFORMATION **1**

SITE INSPECTION OBJECTIVES **7**

Goal 8
Objectives 8
Roles & Responsibilities 8
Site Inspection Process 9
Technical Project Planning Process 9

BACKGROUND INFORMATION **10**

Site Description and Regulatory History 11
Operational History and MEC/MC Characteristics 13
Groundwater 13
Surface Water 14
Terrestrial Exposure 14
Air 15

CONCEPTUAL SITE MODEL **16**

Overview 17
Conceptual Site Model – Small Arms Ranges 18
Conceptual Site Model – Explosive Munitions Ranges 23
Conceptual Site Model – Live Hand Grenade Courts 29
Conceptual Site Model – Practice Grenade Courts 33
Conceptual Site Model – Chemical Identification Area No. 182 35
Data Gaps 37

PROPOSED SAMPLING SCHEME **40**

Proposed Field Investigation 41

TPP NOTES AND DATA QUALITY OBJECTIVES **43**

Technical Project Planning and Development of Data Quality Objectives 44
TPP Phases 44
Data Quality Objectives 48
Next Steps 50

FIGURES **51**

TABLES **52**

DRAFT WORKSHEETS **53**

ABBREVIATIONS AND ACRONYMS

AOC	area of concern
ASR	Archives Search Report
bgs	below ground surface
CSM	Conceptual Site Model
CWM	chemical warfare materiel
DoD	Department of Defense
DQO	Data Quality Objective
ºF	degrees Fahrenheit
ft	feet
FUDS	Formerly Used Defense Site
GPS	Global Positioning System
HRS	Hazard Ranking System
INPR	inventory project report
MC	munitions constituents
MEC	munitions and explosives of concern
lb	pound
mm	millimeter
MMRP	Military Munitions Response Program
MRS	Munitions Response Site
MRSPP	Munitions Response Site Prioritization Protocol
NDAI	No Department of Defense Action Indicated
OB/OD	Ordnance Burial/Ordnance Disposal
ODEQ	Oregon Department of Environmental Quality
OR	Oregon
OSU	Oregon State University
PAH	polycyclic aromatic hydrocarbons
PCOC	potential contaminant of concern
PRG	Preliminary Remediation Goal
RAC	Risk Assessment Code
RI/FS	Remedial Investigation/Feasibility Study
Shaw	Shaw Environmental, Inc.
SHPO	State Historic Preservation Office
SI	Site Inspection
SSI	Screening Site Report
SSWP	Site-Specific Work Plan
TCRA	time-critical removal action
TNT	trinitrotoluene
TPP	Technical Project Planning
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
UXO	unexploded ordnance
yds	yards

Administrative Information

The Technical Project Planning (TPP) Memorandum is one in a series of documents used during the Site Inspection (SI) process to document the information collected and processes used to evaluate Formerly Used Defense Sites (FUDS) for the possible presence of munitions and explosives of concern (MEC) and/or munitions constituents (MC). TPP Meeting information provided in the Memorandum reflects both the original version of information shared with meeting participants, as well as changes/updates to site-specific information obtained during the TPP Meeting.

The TPP Meeting for the former Camp Adair/Adair Air Force Station was conducted on April 5, 2006 at the Holiday Inn Express located in Corvallis, Oregon (OR). Representatives from the United States Army Corps of Engineers (USACE) – Omaha District Military Munitions Design Center, Hazardous, Toxic, and Radioactive Waste Center of Expertise, and Seattle District, Oregon Department of Environmental Quality (ODEQ), Shaw Environmental, Inc. (Shaw), along with other stakeholders were in attendance. A separate public meeting was held in the evening at the Santiam Christian School, Adair Village, OR. An optional windshield site tour, attended only by Shaw representatives, was conducted on April 6, 2006.

The TPP Memorandum documents discussions for the TPP meeting and includes the sections described below:

- **Administrative Information:** includes meeting logistics, the list of attendees, and a summary of the meeting;
- **Site Inspection Objectives:** provides the goal and objectives of the SI, roles and responsibilities, the SI process, and the TPP process;
- **Background Information:** includes the Camp Adair FUDS and project history, area physical setting, a summary of previous environmental work, and an introduction to the areas of concern (AOCs) addressed by the SI;
- **Conceptual Site Model (CSM):** used to identify environmental attributes, potential human and ecological receptors in the area's environment, and the relationships between these factors;
- **Proposed Sampling Scheme:** used to describe the type and quantity of samples to be taken, and the analytical methods to be used for characterizing the AOC;
- **TPP Notes and Data Quality Objectives (DQOs):** used to capture project and site-specific information as discussed during the TPP Meeting to ensure the necessary and appropriate information is shared among meeting participants, and that meeting participants concur with the identified goal, objectives, and approach used to complete the SI process; and
- **Worksheets:** includes the **Site Information Worksheet,** Draft **Munitions Response Site Prioritization Protocol** (MRSPP) **Data Gaps, and Hazard Ranking System** (HRS) **Data Gaps.**

Meeting Location: Corvallis, OR
USACE District: Seattle
TPP #1 Meeting Date: 4/5/06

Agenda

Wednesday, April 5, 2006

- **Convene**
  - Location – Holiday Inn Express, 781 NE 2nd St, Corvallis, OR 97330
  - Introductions
  - Review Site Inspection Objectives
    - Goals, Objectives, Roles & Responsibilities
    - Site Inspection Process
    - Technical Project Planning (TPP) Process
- **TPP Discussion**
- **Summary/Concurrence**
- **Adjourn**
- **Convene Public Meeting**
  - Location – Santiam Christian School, 7220 NE Arnold Ave, Adair Village, OR 97330-9443; phone: (541) 745-5524
- **Adjourn Public Meeting**

Thursday, April 6

- **Optional windshield tour of Camp Adair FUDS**

Technical Project Planning Meeting
Minutes/Summary of Agreements

The TPP Meeting for former Camp Adair was held at the Holiday Inn Express in Corvallis, OR on April 5, 2006. Representatives from the USACE - Omaha Military Munitions Design Center, Hazardous, Toxic, and Radioactive Waste Center of Expertise, and Seattle District, Shaw, ODEQ, Oregon National Guard, U.S. Forest Service, Benton County, Oregon Department of Fish and Wildlife, Polk County, Oregon State University Forestry Department, and Allied Waste were in attendance.

Shaw reviewed site information and presented a summary of the proposed approach for the SI, addressing MEC reconnaissance and MC sampling. ODEQ were in general agreement with the approach and the decision rules that were developed, but reserved judgment until details are presented in the Site-Specific Work Plan (SSWP) (Shaw, 2006).

Specific discussion points with ODEQ included:

Soil Background Values: Shaw proposed to collect 10 soil samples to develop a background soil concentrations for metals. Locations and statistical evaluation methods will be discussed in the SSWP.

Soil Sampling: Max Rosenberg (ODEQ) said that the SSWP needs to provide the rationale for the sampling locations and density. He added that the soil screening values will use the revised list to be provided by David Anderson (ODEQ-Bend) in the Camp Abbot meeting. Where there are no screening values, EPA Region 9 Preliminary Remediation Goals (PRGs) will be used.

Shaw proposed use of 7-point composite samples, and sieving soil samples for lead or metals prior to analysis. It was discussed that sieving samples is a commonly accepted practice for samples from small arms ranges to be used for risk assessment. ODEQ requested time to evaluate.

ODEQ expressed concern that a 0 to 2-inch (in) soil sample depth may not be deep enough and that a 0 to 6-in soil sample may be more appropriate – ODEQ will verify. The basis is that much of the site is now farmland and has been tilled and surface soil has been mixed with deeper soil.

Ecological Screening: Norm Reed (ODEQ) stated that for ecological screening, use Level 2 ecological screening values.

Human Health Screening: Max Rosenberg (ODEQ) stated that risk action levels are 10^{-6} for individual contaminants and 10^{-5} for cumulative effects.

Perchlorate: Perchlorate sampling is proposed for AOCs where 50-caliber tracer ammunition was used.

Valuable information was obtained from stakeholders as follows:

Infiltration Range No. 143 AOC: Brian Stone (Allied Waste) informed the group that the infiltration range located south of Coffin Butte is now a landfill, and area has been excavated and covered with 200 feet (ft) of municipal waste.

Oregon National Guard Property: Jerry Elliot (Oregon National Guard) stated that the National Guard has had no activity on private land adjacent to National Guard property. However, some maneuvers on State Forest Land southwest of the facility have occurred, including some use of simulators.

MEC Find: Brian Stone (Allied Waste) stated that the illumination grenade described as being reported at the landfill (1997) in the slides may be misrepresented. As he recalls, bulk white phosphorus was found when a pond was drained for construction of the landfill. Allied Waste's contractor at the time, EMCON, was called and reportedly handled the situation. Subsequent to the TPP meeting, Shaw has confirmed that a small amount of soil containing white phosphorus was discovered in 1994 during expansion of the landfill (EMCON, 1994), in the vicinity of the Infiltration Range No. 143 AOC. Approximately 50 to 70 cubic yards (yds) of soil was treated by allowing the white phosphorus soil to auto-ignite and burn.

Dave Lysne, Oregon State University (OSU), indicated that a mortar round was found on state agricultural land, T10S, R5W, Section 9, NW ¼ of SW ¼, near end of forest road 142 (marked location on map).

Gordon Brown (Benton County) knows of range berms that were excavated during development of land in the area (apparently Range Complex No. 4). He also knows of an owner with concerns or suspicions of unexploded ordnance (UXO) on his property.

Activities on OSU Land: Dave Lysne (OSU) asked that when sampling on OSU property, coordinate with OSU to have cultural surveys completed at sampling locations. They will need a couple of weeks notice.

Stakeholders: City of Adair Village was identified as a potential stakeholder but no representatives were present at the meeting.

List of Attendees available upon request

Site Inspection Objectives

Goal

- The USACE is conducting SIs of FUDS properties to determine if any MEC or related MC are present on property formerly owned or leased by the U.S. Department of Defense (DoD).

Objectives

- Determine if the site requires further response action due to the presence of MEC/MC.
- Collect minimum information needed to:
    - Eliminate a site from further consideration if:
        - No evidence of MEC and/or
        - Concentrations of MC in samples are below risk-based action levels, or below background concentrations; or
    - Determine the potential need for removal action or initiation of the Remedial Investigation/Feasibility Study (RI/FS) if:
        - MEC identified and/or
        - Concentrations of MC in samples exceed risk-based action levels and background concentrations.
    - Provide sufficient data for the U.S. Environmental Protection Agency (USEPA), ODEQ, and the Army to prioritize future actions using the HRS and MRSPP.

Roles & Responsibilities

- **USACE:** Acts as the executing agency for the DoD with regard to the FUDS program. In this role, the USACE has decision making authority and is responsible for ensuring work is conducted in accordance with applicable USACE and federal guidance. Additionally, USACE coordinates and works with project team members to meet needs expressed by regulatory agencies and stakeholders to the extent possible within programmatic guidelines.
- **Regulatory Agency:** Participates in planning of SI activities in order to meet applicable requirements and stakeholders expectations.
- **Property Owner(s)**: Provides available and pertinent information about the area, identifies current and anticipated future land uses for the property, and participates in project team discussions.
- **Shaw**: As a contractor to the USACE, conducts work on behalf of the USACE, provides TPP materials, makes site information available to the project team through a web-based information portal, and conducts and reports SI activities.

Site Inspection Process

- Data review,
- TPP,
- SSWP,
- SI field activities – reconnaissance, sampling, and analysis, and
- SI Report.

Technical Project Planning Process

- Conduct TPP meeting(s)* with key organizations and stakeholders;
- Identify stakeholder(s) concerns;
- Identify all AOCs for this SI;
- Review site information;
- Verify current and anticipated future land use;
- Develop CSM;
- Identify data gaps;
- Plan how to address data gaps;
- Develop DQOs for meeting SI requirements; and
- Concur on SI field work approach.

* Second TPP meeting to be determined by team members during the 1st TPP meeting.

Background Information

Site Description and Regulatory History

Background and historical information (including references to interviews and historical documents) contained in this package was obtained from the *Archives Search Report* (ASR) (USACE, 2001), the *ASR Supplement* (USACE, 2004), and the *Ground-Water Hydrology of the Willamette Basin* (Conlon et al., 2005).

Site Location

- The former Camp Adair/Adair Air Force Station (referred to in this document as Camp Adair except when specifically referring to non-Army use) is located approximately 9 miles north of Corvallis, OR, in Polk, Benton, and Linn Counties (Figure 1).
- Camp Adair occupied 56,815.17 acres of land, acquired from 1941 through March 1944.
- Camp Adair has 21 AOCs (see table on following page), that can be divided in five types of AOCs: Small Arms Ranges, Explosive Munitions Ranges, Live Hand Grenade Courts, Practice Grenade Courts, and Chemical Identification Area

Figures 3 through 17 show the locations of the AOCs.

Physical Setting

- The landscape of the former camp is relatively flat to mountainous, variously vegetated with crops, grasses, shrubs, and trees.
- Current and expected future land use within the area of former Camp Adair include agriculture, private, state and national forest land, wildlife management and recreation areas, state and county parks, residences, and business. The Oregon National Guard maintains a rifle range.
- Monmouth and Adair Village are the nearest towns, with populations of approximately 7,700 and 500, respectively. Polk County has a population of approximately 62,000, Benton County has approximately 78,000, and Linn County has over 103,000.
- Camp Adair is in the Willamette Valley, with the Coast Range on the west and the Cascade Range on the east. The annual rainfall of the area averages 35-40 inches. Most of the precipitation occurs during November to March. In the immediate area, there are only 3 or 4 days a year with measurable amounts of snow. The mean average daily temperature is 61 degrees Fahrenheit (ºF) in the summer and 42 ºF in the winter.

Previous Investigations and Regulatory History

- In 1992, USACE completed an inventory project report (INPR) for Camp Adair, identifying a potential hazard from ordnance at the FUDS.
- In 1996, a Screening Site Inspection (SSI) for Camp Adair was completed for the USEPA by URS Consultants (URS, 1996). The SSI focused on the sediment pathway. The data contained in this report was reviewed for use in this SI. The data presented in the report stated that the data did not show any adverse impacts to sediments from activities related to Camp Adair. The data were collected in April 1996 and may not meet the contract

required detection limits. In addition, the data have limited value without additional data backup. The analytical reports provided in the appendix which contain the complete analytical results do not use the same sample numbers as reported in the main text of the document. There is no cross reference key provided in the report to equate the different sample numbers.

- USACE issued an ASR in 2001, which compiled available information for Camp Adair with emphasis on types, quantities, and areas of ordnance use and disposal.
- An ASR Supplement, completed in 2004, identified specific AOCs.
- A Risk Assessment Code (RAC) scoring was conducted by USACE in 2004. Possible scores range from 5 (no risk) to 1 (high risk). The following table summarizes the RAC determinations for the AOCs and indications of whether MEC has been found at these AOCs since the end of Army training:

AOC	RAC Score	MEC Found
Skeet Range No. 580	5	No
Practice Grenade Court No. 120	4	No
Practice Grenade Court No. 121	4	No
Practice Grenade Court No. 122	4	No
Practice Grenade Court No. 125	4	No
Practice Grenade Court No. 126	4	No
Practice Grenade Court No. 127	4	No
Infiltration Range No. 143	2	No
Chemical Identification Area No. 182	1	No
East Live Hand Grenade Court	3	Yes
West Live Hand Grenade Court	3	No
Live Hand Grenade Court No. 129	3	Yes
Bombing Target No. 1	3	No
Mortar Range	2	Yes
Moving Target Range No. 75	3	Yes
Range Complex No. 1	2	Yes
Range Complex No. 2	1	Yes
Range Complex No. 3	3	No
Range Complex No. 4	5	No
Range Complex No. 5	5	No
Range Complex No. 6	5	No

Operational History and MEC/MC Characteristics

Historic Military Operations

- Camp Adair was used for training of triangular (three-regiment) infantry divisions between 1942 and 1945. Training activities for four army infantry divisions included use of small arms, explosives, mortars, artillery, antiaircraft and antitank guns, and support by tanks and Army Air Forces aircraft.
- Other uses of the camp from 1944 to 1946 included bombing and gunnery practice for Navy/Marine pilots, a storage facility, a prisoner of war camp, and a Navy hospital.
- Camp Adair included a cantonment area east of Highway 99 and a live fire and maneuver area to the west.
- During the last 2 years of training, an estimated 265,000 rounds of high explosive ammunition (37-millimeter [mm] or larger) were fired.
- Camp Adair was declared surplus and assigned for disposition in April 1946.
- A War Department letter of August 1946 stated that Camp Adair had been "dedudded" so as to make it reasonably safe for any use. A Certificate of Clearance was issued in March 1947.
- After several years of inactivity the cantonment area was used as Adair Air Force Station between 1958 and 1969. Related munitions training activity was limited to use of Skeet Range No. 580 in the cantonment area (between 1955 and 1964).
- In 1970, the Adair Air Force Station lands were determined excess and reported to the General Services Administration for disposal.
- The Oregon National Guard has used a former Army range, the Known Distance Rifle Range No. 4, over the period from 1946 to the present. This is part of a 527-acre facility in which the National Guard conducts weapons qualification and field exercises.
- Over the years (and as recently as 2001), UXO has been found at the former Camp Adair, including 2.36-in anti-tank rockets, and 60-mm, 81-mm, 105-mm, and 155-mm rounds. Locations of some of these UXO finds are plotted on Figure 1.

MEC/MC Characteristics

- The MEC/MC used at the AOCs and land use controls are presented in Table 1.
- MEC finds within the AOCs are shown on Figures 3 through 17.

Groundwater

- The site is located in the Oregon Coast Range section of the Pacific Border physiographic province.
- Soils at the site are silty, sandy clays with varying gravel content. Potential for soil erosion is severe in some areas. Potential frost depths extend to 24 inches.

- Bedrock consists of Tertiary submarine lavas and marine sediments. Alluvial deposits of silts and pebbly sands with lenses of gravel overlie bedrock in the valleys of the Luckiamute River and tributary streams.
- Shallow groundwater within the site is generally within one of two hydrogeologic units: the basement confining unit (bedrock) in upland areas, characterized by low permeability, porosity, and well yield; and the Willamette silt unit, characterized by high porosity but low permeability and well yield, although it may be a significant source of recharge to underlying units (Conlon et al., 2005).
- In lowland areas, groundwater discharges to streams. During wet winter months, this may be a relatively small component of the total stream flow, but in dry summers groundwater is the main component of stream flow (Conlon et al., 2005).
- Domestic water supply wells located throughout the site (Figure 2) typically tap the basement confining unit (bedrock). Depths range from 50 ft or less to several hundred ft. In many cases, well records indicate that the well bores are uncased through most of the bedrock interval. Static water levels are generally from 10 to 40 ft below ground surface (bgs).

Surface Water

- The site is located within the Upper Willamette watershed and is drained in a generally eastern direction by tributaries of the Willamette River. The Luckiamute River, which is the largest surface water feature flowing through the area of the former Camp Adair, is characterized by relatively high flows in winter months (generally 500 to 2000 cubic ft per second), with low summer flows. A hydrogeologic map and cross sections of the area are shown on Figures 18 and 19.
- Surface water and groundwater are the primary sources of water for various public water systems in the area. The Adair Village water system uses surface water; the Monmouth water system uses groundwater.

Terrestrial Exposure

- Residences are located within many of the AOCs.
- The following federally listed threatened or endangered species may occur on or near Camp Adair (USACE, 2001). The U.S. Fish and Wildlife Service will be contacted for an updated species list.

Endangered Species	Threatened Species
Oregon chub	Aleutian Canada goose,Bald eagle
Fender's blue butterfly	Northern spotted owl
Willamette daisy	Steelhead, Chinook salmon
Bradshaw's lomatium	Golden Indian paintbrush
	Howellia
	Kincaid's lupine, Nelson's checkermallow

- The State Historical Preservation Office (SHPO) will be contacted to determine if historical or other cultural resources are present in the area.

Air

- The nearest populated areas are the town of Monmouth on the northeast side, and Adair Village within the southeast area of the former camp.
- No previous air sampling was performed at the site.

Conceptual Site Model

Overview

A site-specific CSM summarizes available site information and identifies relationships between exposure pathways and associated receptors. A CSM is used to determine the data types necessary to describe site conditions and quantify receptor exposure, and discusses the following information:

- Current and future land use;
- Potential contaminant sources (e.g., lead projectiles in an impact berm);
- Affected media;
- Governing fate and transport processes (e.g., surface water runoff and/or groundwater migration);
- Exposure media (i.e., media through which receptors could contact site-related contamination);
- Routes of exposure (e.g., inhalation, incidental ingestion, and dermal contact); and
- Potential human and/or representative ecological receptors at the exposure point. Receptors likely to be exposed to site contaminants are identified based on current and expected future land uses.

The CSM is evaluated for completeness and further developed as needed through TPP meetings. Based on similar historical use, MEC/MC, and environmental conditions, the following types of AOCs are identified within Camp Adair:

- Small Arms Ranges (5),
- Explosive Munitions Ranges (6),
- Live Hand Grenade Courts (3),
- Practice Grenade Courts (6), and
- Chemical Identification Area (1)

In the section that follows a CSM is presented for each AOC group. and MEC and MC are analyzed ..

The ASR and/or ASR Supplement indicate that MEC (duds) have been found in a number of the explosive ranges. In addition, MEC has been found in and immediately surrounding the former cantonment area. One anti-tank rocket was found on the Camp Adair Parade Ground and a mortar round was found while excavating for two ponds in the south central portion of the cantonment area. A third MEC was reported just west of Highway 99 and the northwest corner of the cantonment area. These finds have not been related to any known AOC.

Conceptual Site Model – Small Arms Ranges

There are five small arms range AOCs and sub-ranges at Camp Adair as follows::

- Infiltration Range No. 143 (Figure 3)
- Range Complex No. 4 (Figures 4, 4A, 4B)
  - Known Distance Rifle Range No. 1
  - Known Distance Rifle Range No. 2
  - Known Distance Rifle Range No. 3
  - Known Distance Rifle Range No. 4
  - Thompson Sub Machine Gun Range No. 50
  - Thompson Sub Machine Gun Range No. 50A
  - Mini A-A Range No. 60, 61, 62
  - Mini A-A Range No. 65, 66, 67
  - Anti Aircraft Range No. 70
  - Field Combat Range No. 80
  - Field Combat Range No. 80A
  - Field Combat Range No. 80B
  - Field Combat Range No. 81
  - Infiltration Range No. 141
  - Transition Course No. 160
  - Close Combat Course No. 170
- Range Complex No. 5 (Figure 5)
  - 1000-in Machine Gun Range No. 20, 21, 22, 23
  - 1000-in Anti-Tank Range No. 45, 46
  - 1000-in Anti-Tank Range No. 40, 41
  - 1000-in Pistol Range No. 15
  - 1000-in Landscape Range No. 35, 36, 37
- Range Complex No. 6 (Figure 6)
  - 1000-in Pistol Range No. 11
  - 1000-in Landscape Range 30, 31, 32
  - 1000-in Landscape Range No. 33
  - 1000-in Landscape Range No. 34
- Skeet Range No. 580 (Figure 7)

Current and Future Land Use

- A large portion of the small arms range AOCs are currently residential properties.
- Other uses include a county park adjacent to residential areas (Skeet Range No. 580), landfill (Infiltration Range No. 143), state forest, and an active National Guard small arms range and maneuver area (portions of Range Complex No. 4).
- Portions of Range Complex No. 4 currently being used by the Oregon National Guard will not be included in this SI due to active training activities at the site.
- Infiltration Range No. 143 is not accessible for purposes of this SI. The range area is now used as a landfill and has been heavily excavated and covered with municipal waste.

Former Range Use

- The ranges were used by the Army between 1942 and 1945, with the exception of the skeet range, which was used between 1955 and 1964 as part of the Adair Air Force Station facility.
- Weapons used at these ranges were limited to small arms (.22 to .50 caliber).
- Known use of explosives at these ranges was limited to static charges of dynamite or trinitrotoluene (TNT) (detonated with blasting caps) in craters at Infiltration Range No. 141 (Range Complex No. 4) and Infiltration Range No. 143.
- At some ranges, small arms fire would tend to be concentrated in backstops; i.e., manmade berms or natural hillsides (Figure 20). Berms are still evident at Known Distance Rifle Ranges No. 1 through 4 (Range Complex No. 4).
- At other ranges, small arms fire would tend to be dispersed over a wide area; e.g., the anti-aircraft ranges and the skeet range (Figure 21).

MEC Evaluation

Types of MEC

- The munitions used at these AOCs were limited to small arms rounds, which do not pose a significant explosive hazard.
- Limited use of explosives (dynamite, TNT, and blasting caps) on two infiltration ranges was more highly controlled than typical use of explosive munitions. Static charges were detonated in craters within the courses to simulate combat conditions. The potential for unexploded ordnance to be present at these locations is low, although there is some potential for unknown explosive munitions.
- Based on non-infantry use of the skeet range by the Air Force, the Skeet Range No. 580 AOC is considered to pose no significant risk from MEC.

Surface Exposure Pathway

- Slight MEC risk is associated with potential for unknown use of explosive MEC at the small arms ranges.

Subsurface Exposure Pathway

- Slight MEC risk is associated with potential for unknown use of explosive MEC at the small arms ranges.

An analysis of the exposure pathways and receptors for MEC are provided in Table 2.

MEC Evaluation/Investigation Needed

- Visual reconnaissance and localized magnetometer sweeps will be conducted to assess the presence of MEC within the Small Arms Ranges.

MC Evaluation

Types of MC

- The anticipated MC at the small arms ranges is lead from the munitions debris.
- A relatively small quantity of copper and antimony are present in military bullets. Because lead accounts for more than 96 percent of the bullet mass, analysis for lead alone will be adequate as an indicator of MC contamination.
- The only known potential use of explosives at the small arms ranges was limited to infiltration courses, which typically used reduced charges of explosives placed in craters to simulate combat conditions. Two infiltration courses have been identified: Infiltration Range No. 141 (within Range Complex No. 4), and Infiltration Range No. 143. Neither of these locations is accessible for purposes of the site inspection. Infiltration Range No. 141 is located in the active National Guard facility. The area of Infiltration Range No. 143 is now a landfill; the range area is no longer accessible and has been heavily excavated and covered with municipal waste (statement by Brian Stone of Allied Waste during TPP meeting).
- Perchlorate may have been present in tracer rounds where .50 caliber machine guns were used (Range Complexes No. 4 and 5).
- Polycyclic aromatic hydrocarbons (PAH) may be present from targets used at Skeet Range No. 580.

Overview of Pathways

Affected media and potential pathways for MC include:

- Soil: Soil is the primary medium of concern because of possible MC in the soil from training activities. The soil also serves as a source of potential air, surface water, or groundwater contamination.
- Surface Water/Sediment: Surface water may act as a migration pathway from potential sources of contamination in soil. Accumulation of lead and explosives may occur in sediment along surface water migration pathways through mass transport of soil into streams and leaching of contamination into surface water. Sediment will be the primary sample medium to assess surface water pathways.

- Groundwater: Groundwater is considered a potentially affected media because it is generally present within 40 ft of ground surface. Groundwater may also serve as a migration path to downgradient surface water.
- Air: Inhalation of MC in vapor form is not a pathway of concern for non-volatile MC under normal environmental conditions. Potential inhalation of soil particles is included in the development of health-based screening values for soil.

Potential exposure media at the small arms ranges include soil, surface water/sediment, and groundwater. A pathway evaluation for these media is discussed below and provided in Table 2.

Soil Exposure Pathway

Exposure Routes

- The potential routes of human exposure to contaminated soils include incidental ingestion of and dermal contact with contaminated media, as well as inhalation of soil particulates during intrusive work.
- The potential routes of livestock and wildlife exposure to contaminated soils include ingestion of and direct contact with contaminated media. Plants may uptake MC and then subsequently be eaten by livestock and wildlife. Burrowing animals may ingest MC-contaminated soil and subsequently be eaten by predators.

Receptors

- Residents.
- Workers (farmers, foresters, etc).
- Recreational users.
- Livestock and wildlife.

Soil MC Evaluation/Investigation Needed

- Soil samples to be collected at locations within the AOCs (primarily impact areas).
- Samples to be analyzed for lead.
- Samples from the Skeet Range No. 580 will be analyzed for lead and PAHs.
- No samples from Infiltration Range No. 143 course area will be collected. The site is being used as a landfill and has been heavily reworked and excavated and is covered with municipal waste.
- No sampling will be conducted within ranges currently used by the Oregon National Guard. The property is being used for active training exercises.

Surface Water/Sediment Exposure Pathway

Exposure Routes

- The potential routes of human exposure to contaminated surface water and sediment include ingestion, dermal contact, and inhalation.

- The potential routes of livestock and wildlife (including aquatic organisms) exposure to contaminated surface water include ingestion and direct contact.

Receptors

- Residents.
- Workers (Farmers, foresters, etc).
- Recreational users.
- Livestock and wildlife.

Surface Water/Sediment MC Evaluation/Investigation Needed

- Sampling of potential source soils provides information regarding potential impact to surface water pathways.
- One sediment sample will be collected at the largest small arms range complex, where range activity indicates less concentrated accumulation of lead from bullets may be expected.
- Sample to be analyzed for lead.

Groundwater Exposure Pathway

Exposure Routes

- The potential routes of human exposure to contaminated groundwater include ingestion and dermal contact where groundwater is used as a water supply.
- Direct exposure of wildlife to groundwater is not a concern. The potential routes of livestock exposure include ingestion and dermal contact where groundwater is used as a water supply.

Receptors

- Residents.
- Workers (farmers, foresters, etc).
- Recreational users.
- Pets or livestock.

Groundwater MC Evaluation/Investigation Needed

- Groundwater samples at or near some of the major ranges will be collected from existing wells—specific locations to be determined.
- To the extent practicable, well selection will favor the following criteria: location within or near a potential source area, wells open or unsealed within 30 ft of ground surface, total depth of 100 ft or less, and wells listed in the USGS monitoring database.
- One groundwater sample will be collected in the vicinity of each of the three small arms range complexes. The samples will be analyzed for total lead (also perchlorate at Range Complexes 4 and 5 where a potential perchlorate source is indicated by use of .50 caliber machine guns).

Conceptual Site Model – Explosive Munitions Ranges

There are six explosive munitions range AOCs and sub-ranges at Camp Adair as follows::

- Range Complex No. 1 (Figures 8, 8A through 8D)
  - Fortified Training Area No. 76
  - Bombing Target No. 2
- Range Complex No. 2 (Figures 8, 8A through 8D)
  - Field Combat Range No. 51
  - Moving Target Range No. 79A
  - Moving Target Range No. 79B
  - Field Combat Range No. 83
  - Field Combat Range No. 84
  - Field Combat Range No. 84A
  - Field Combat Range No. 85
  - Field Combat Range No. 86
  - Field Combat Range No. 86A
  - Field Combat Range No. 87
  - Field Combat Range No. 87A
  - Field Combat Range No. 87B
  - Field Combat Range No. 88
  - Field Combat Range No. 89B
  - Mortar Range No. 90
  - Infiltration Range No. 142
- Bombing Target No. 1 (Figure 8 and 8A)
- Range Complex No. 3 (Figure 9)
  - Field Combat Range No. 89
  - Field Combat Range No. 89A
  - Field Combat Range No. 89C
- Mortar Range (Figure 10)
- Moving Target Range No. 75 (Figure 11)

Current and Future Land Use

- A large portion of the explosive munitions range AOCs are located in the north half of the FUDS on private land. Land use is largely agricultural and forestry related, with a relatively low number of residences (less than 300).
- Two ranges in the south half of the FUDS are principally located on state forest land.

Former Range Use

- The ranges were used by the Army between 1942 and 1945.
- Navy and Marine Corps pilots also conducted bombing and gunnery operations in the north area of the FUDS sometimes referred to as the artillery range (principally Range Complexes No. 1 and 2 and Bombing Target No. 1).
- Munitions used varied from range to range but at Range Complexes No. 1 and 2 all infantry and crew-served conventional weapons were authorized for use. Weapons used included the .30 caliber rifle, automatic rifle, .30 caliber light and heavy machine guns, .50 caliber machine gun, anti-tank guns, 105-mm and 155-mm howitzers, mortars, and 2.36-inch anti-tank and practice rockets.
- Exercises included support by tank and aircraft (the latter using 100-pound (lb), 300-lb, and 500-lb general-purpose and practice bombs).
- Explosives, blasting caps, and incendiary, illumination, and smoke devices were also used.
- The range complexes included many overlapping safety fans and supported multiple activities that simulated combat conditions (Figure 22).
- Much of the explosive munitions fire was directed toward specific targets, creating impact areas. A 1947 Certificate of Clearance included a recommendation that three land tracts be restricted to grazing or timbering activity due to a high concentration of shell firing (i.e., the "Impact Areas" of Figure 3).
- Craters caused by explosive munitions were visible during and shortly after the use of these ranges, but these areas have generally been regraded for agricultural or other purposes.

MEC Evaluation

Types of MEC

- The munitions used in Range Complexes No. 1 and 2 included the full range of infantry munitions described above.
- Munitions at Range Complex No. 3 included general small arms, .50 caliber machine gun, large caliber high explosive projectiles (105-mm HE M1, 155-mm HE M107, 37-mm HE M54, 57-mm APC-T M86, and mortars (60-mm HE M49, 81-mm HE M43, 60-mm practice M50A2, 81-mm TP M43A1).

- Munitions at the Mortar Range included general small arms and mortars (60-mm HE M49, 81-mm HE M43, 60-mm Training M69, 60-mm Training M50A2, 81-mm Training M68, and 81-mm Training M43A1).
- Munitions at the Moving Target Range No. 75 included large caliber projectiles (75-mm HE M48, 37-mm AP M74).
- A listing of munitions used on the explosive munitions ranges is provided on Table 1.
- The ASR and/or ASR Supplement indicate that MEC ("duds") have been found at the following explosive munitions ranges (locations of reported MEC finds are plotted on the figures of each AOC):
    - Range Complex No. 1
    - Range Complex No. 2
    - Mortar Range
    - Moving Target Range No. 75
- The potential hazard from MEC is significant, as indicated by reported encounters of explosive MEC since the late 1940's and as recently as 2001.

Surface Exposure Pathway

- The potential route of human exposure to MEC or munitions debris includes direct contact by vehicles, foot traffic, or handling. Human exposure would potentially include residents, workers, and recreational users.
- The potential route of livestock and wildlife exposure to MEC or munitions debris would be by direct contact.

Subsurface Exposure Pathway

- The potential routes of human exposure to MEC or munitions debris would be through intrusive activity, agricultural tilling, or geologic instability (erosion, freeze-thaw, etc.).
- The potential route of livestock and wildlife exposure to MEC or munitions debris would be by burrowing activities or geologic instability.

An analysis of the exposure pathways and receptors for MEC are provided in Table 2.

MEC Evaluation/Investigation Needed

- The presence of MEC has been established for the Explosive Munitions Ranges and no visual reconnaissance or magnetometer sweeps will be conducted to assess the presence of MEC. Visual reconnaissance with the aid of a magnetometer of selected portions of the AOCs will be completed with the objective of locating suitable sampling locations and MEC avoidance for safety.

MC Evaluation

Types of MC

- The anticipated MC at the explosive munitions ranges is primarily residual explosive compounds from munitions that underwent high-order (normal) or low-order detonation, or from undetonated munitions.
- To a lesser degree, there is a potential for the presence of elevated concentrations of metals. Sources would primarily include the metallic content of the projectiles and other munitions components. Small quantities of metals were also used in tracers, incendiary mixtures, and in primary explosives.
- Perchlorate may have been present as a component of some munitions, i.e., in tracer rounds where .50 caliber machine guns were used (Range Complexes No. 1, 2, and 3, and Mortar Range) and 2.36-inch rockets.

Overview of Pathways

Affected media and potential pathways for MC include:

- Soil: Soil is the primary medium of concern because of possible MC in the soil from training activities. The soil also serves as a source of potential air, surface water, or groundwater contamination.
- Surface Water/Sediment: Surface water may act as a migration pathway from potential sources of contamination in soil. Accumulation of explosives and metals may occur in sediment along surface water migration pathways through mass transport of soil into streams and the leaching of contaminants into surface water. Sediment will be the primary sample medium to assess surface water pathways.
- Groundwater: Groundwater is considered a potentially affected media because it is generally present within 40 ft of ground surface. Groundwater may also serve as a migration path to downgradient surface water.
- Air: Inhalation of MC in vapor form is not a pathway of concern for non-volatile MC under normal environmental conditions. Potential inhalation of soil particles is included in the development of health-based screening values for soil.

Potential exposure media at the explosive munitions ranges include soil, surface water/sediment, and groundwater. A pathway evaluation for these media is discussed below and provided in Table 2.

Soil Exposure Pathway

Exposure Routes

- The potential routes of human exposure to contaminated soils include incidental ingestion of and dermal contact with contaminated media, as well as inhalation of soil particulates during intrusive work.
- The potential routes of livestock and wildlife exposure to contaminated soils include ingestion of and direct contact with contaminated media. Plants may uptake MC and

then subsequently be eaten by livestock and wildlife. Burrowing animals may ingest MC-contaminated soil and subsequently be eaten by predators.

Receptors

- Residents.
- Workers (farmers, foresters, etc).
- Recreational users.
- Livestock and wildlife.

Soil MC Evaluation/Investigation Needed

- Soil samples to be collected at locations within the AOCs (1 to 7 samples per AOC, primarily at impact areas).
- Samples to be analyzed for explosives and selected metals (aluminum, antimony, barium, cadmium, chromium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, strontium, titanium, and zinc).

Surface Water/Sediment Exposure Pathway

Exposure Routes

- The potential routes of human exposure to contaminated surface water and sediment include ingestion, dermal contact, and inhalation of water.
- The potential routes of livestock and wildlife (including aquatic organisms) exposure to contaminated surface water include ingestion and direct contact.

Receptors

- Residents.
- Workers (farmers, foresters, etc).
- Recreational users.
- Livestock and wildlife.

Surface Water/Sediment MC Evaluation/Investigation Needed

- Sampling of potential source sediments provides information regarding potential impact to surface water pathways.
- Sediment samples will be collected at locations within or downslope of the AOCs (1 to 2 samples per AOC).
- Samples to be analyzed for explosives and selected metals (aluminum, antimony, barium, cadmium, chromium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, strontium, titanium, and zinc).

Groundwater Exposure Pathway

Exposure Routes

- The potential routes of human exposure to contaminated groundwater include ingestion and dermal contact where groundwater is used as a water supply.
- Direct exposure of wildlife to groundwater is not a concern. The potential routes of livestock exposure include ingestion and dermal contact where groundwater is used as a water supply.

Receptors

- Residents.
- Workers (farmers, foresters, etc).
- Recreational users.
- Livestock.

Groundwater MC Evaluation/Investigation Needed

- One groundwater sample will be collected at each AOC (two samples at Range Complex No. 2).
- To the extent practicable, well selection will favor the following criteria: location within or near a potential source area, wells open or unsealed within 30 ft of ground surface, total depth of 100 ft or less, and wells listed in the USGS monitoring database.
- Samples to be analyzed for explosives, selected total metals (aluminum, antimony, barium, cadmium, chromium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, strontium, titanium, and zinc), and perchlorate.

Conceptual Site Model – Live Hand Grenade Courts

There are three live hand grenade court AOCs at Camp Adair as follows:

- East Live Hand Grenade Courts (Figure 12)
- West Live Hand Grenade Courts (Figure 13)
- Live Hand Grenade Court No. 129 (Figure 14)

Current and Future Land Use

- These AOCs are currently used for agriculture and tree farming.
- Agricultural buildings and/or residences are located near each AOC.

Former Range Use

- The ranges were used by the Army between 1942 and 1945.
- The courts were used for training in the use of live (explosive) and/or training hand grenades.
- Grenades were thrown from individual throwing bays constructed from sandbags or concrete, or from a trench.
- Grenades were thrown toward targets in an impact area approximately 25 yds from the throwing line (see Figure 23).
- A danger area of approximately 600 ft would have been established around each court.

MEC Evaluation

Types of MEC

- The munitions used included the Mk II fragmentation hand grenade.
- M21 Practice grenades, which contained only small spotting charges of black powder, may also have been used.
- The potential hazard from MEC is significant, as indicated by reported encounters with hand grenades by local residents in the vicinity of at least two of the courts.

Surface Exposure Pathway

- The potential route of human exposure to MEC or munitions debris includes direct contact by vehicles, foot traffic, or handling. Human exposure would potentially include residents, workers, and recreational users.
- The potential route of livestock and wildlife exposure to MEC or munitions debris would be by direct contact.

Subsurface Exposure Pathway

- The potential routes of human exposure to MEC or munitions debris would be through intrusive activity, agricultural tilling, or geologic instability (erosion, freeze-thaw, etc.).

- The potential route of livestock and wildlife exposure to MEC or munitions debris would be by burrowing activities or geologic instability.

An analysis of the exposure pathways and receptors for MEC are provided in Table 2.

MEC Evaluation/Investigation Needed

- The presence of MEC has been established for the Live Hand Grenade Courts and no visual reconnaissance or magnetometer sweeps will be conducted to assess the presence of MEC. Visual reconnaissance with the aid of a magnetometer of selected portions of the AOCs will be completed with the objective of locating suitable sampling locations and MEC avoidance for safety.

MC Evaluation

Types of MC

- The anticipated MC at the explosive munitions ranges is primarily residual explosive compounds from grenades that underwent high-order (normal) or low-order detonation, or from undetonated munitions. The explosive charges used in the Mk II grenades were 2 ounces of TNT (or E.C. Blankfire smokeless powder, consisting largely of nitrocellulose, in older models).
- To a lesser degree, there is a potential for the presence of elevated concentrations of metals from the grenade housing and components which are made primarily from cast iron and steel.

Overview of Pathways

Affected media and potential pathways for MC include:

- Soil: Soil is the primary medium of concern because of possible MC in the soil from training activities. The soil also serves as a source of potential air, surface water, or groundwater contamination.
- Surface Water/Sediment: Surface water may act as a migration pathway from potential sources of contamination in soil (sediment). Accumulation of explosives and metals may occur in sediment along surface water migration pathways through mass transport of soil into streams and the leaching of contaminants into surface water.
- Groundwater: Groundwater is considered a potentially affected media because it is generally present within 40 ft of ground surface. Groundwater may also serve as a migration path to downgradient surface water.
- Air: Inhalation of MC in vapor form is not a pathway of concern for non-volatile MC under normal environmental conditions. Potential inhalation of soil particles is included in the development of health-based screening values for soil.

Potential exposure media at the explosive munitions ranges include soil, surface water/sediment, and groundwater. A pathway evaluation for these media is discussed below and provided in Table 2.

Soil Exposure Pathway

Exposure Routes

- The potential routes of human exposure to contaminated soils include incidental ingestion of and dermal contact with contaminated media, as well as inhalation of soil particulates during intrusive work.
- The potential routes of livestock and wildlife exposure to contaminated soils include ingestion of and direct contact with contaminated media. Plants may uptake MC and then subsequently be eaten by livestock and wildlife. Burrowing animals may ingest MC-contaminated soil and subsequently be eaten by predators.

Receptors

- Residents.
- Workers (farmers, foresters, etc).
- Recreational users.
- Livestock and wildlife.

Soil MC Evaluation/Investigation Needed

- One soil sample will be collected from each AOC.
- Samples to be analyzed for explosives and selected total metals (aluminum, antimony, barium, cadmium, chromium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, strontium, titanium, and zinc).

Surface Water/Sediment Exposure Pathway

Exposure Routes

- The relatively flat location of these AOCs would tend to limit the mobility of MC from the grenade court areas via the surface water/sediment pathway.
- The potential routes of human exposure to contaminated surface water and sediment include ingestion, dermal contact, and inhalation.
- The potential routes of livestock and wildlife (including aquatic organisms) exposure to contaminated surface water include ingestion and direct contact.

Receptors

- Residents.
- Workers (farmers, foresters, etc).
- Recreational users.
- Livestock and wildlife.

Surface Water/Sediment MC Evaluation/Investigation Needed

- These AOCs are of small aerial extent and direct sampling of surface water or sediment is not planned.

Groundwater Exposure Pathway

Exposure Routes

- The potential routes of human exposure to contaminated groundwater include ingestion and dermal contact where groundwater is used as a water supply.
- Direct exposure of wildlife to groundwater is not a concern. The potential routes of livestock exposure include ingestion or dermal contact where groundwater is used as a water supply.

Receptors

- Residents.
- Workers (farmers, foresters, etc).
- Recreational users.
- Livestock.

Groundwater MC Evaluation/Investigation Needed

- A groundwater sample will be collected from a well located near one of the three grenade courts.
- To the extent practicable, well selection will favor the following criteria: location within or near a potential source area, wells open or unsealed within 30 ft of ground surface, total depth of 100 ft or less, and wells listed in the USGS monitoring database.
- Samples to be analyzed for explosives and selected metals (aluminum, antimony, barium, cadmium, chromium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, strontium, titanium, and zinc).

Conceptual Site Model – Practice Grenade Courts

There are six practice grenade court AOCs at Camp Adair as follows:

- Practice Grenade Court No. 120 (Figure 15)
- Practice Grenade Court No. 121 (Figure 15)
- Practice Grenade Court No. 122 (Figure 15)
- Practice Grenade Court No. 125 (Figure 16)
- Practice Grenade Court No. 126 (Figure 16)
- Practice Grenade Court No. 127 (Figure 16)

Current and Future Land Use

- These AOCs are located on privately owned land and air photos suggest they are being used for agricultural purposes.
- The AOCs are located near the E.E. Wilson Wildlife Refuge. The ASR Supplement states that they are located in a wildlife reserve, "part of the Wilson Game Management Area."
- The closest residence appears to be more than 1000 ft from three of the courts (No. 125, 126, and 127).
- Residences are not located within several thousand feet of courts No. 120, 121, and 122.

Former Range Use

- The ranges were used by the Army between 1942 and 1945.
- The courts were used to allow men to throw training or practice grenades prior to throwing a live grenade (see Figure 24).
- A typical practice court consisted of a number of individual courts designed to allow men to throw under a variety of conditions.

MEC Evaluation

Types of MEC

- The munitions used at the practice courts would have included the Mk 1A1 training grenade, an inert device made of cast iron with the approximate shape, size, and weight of an actual hand grenade.
- The munitions used at the practice courts may also have included the M21 practice grenades, reusable devices which contained only small charges of black powder to simulate the detonation of a live grenade.
- There is not a significant hazard from MEC associated with the practice courts, based on the training devices used, as indicated in Table 1.

MEC Evaluation/Investigation Needed

- No visual reconnaissance or magnetometer sweeps will be conducted to assess the presence of MEC at the Practice Grenade Courts. There is not a significant hazard from MEC at these AOCs.

MC Evaluation

Types of MC

- The small quantity of black powder (consisting of potassium nitrate, sulfur, and charcoal) associated with training grenades does not pose a significant risk of environmental contamination, as indicated in Table 1.

MC Evaluation/Investigation Needed

- No field investigation is required for the practice grenade courts.

Conceptual Site Model – Chemical Identification Area No. 182

There is one chemical identification area at Camp Adair as follows:

- Chemical Identification Area No. 182 (Figure 17)

Current and Future Land Use

- This AOC is located on privately owned land and air photos suggest it is being used for agricultural purposes (Figure 17).
- The closest residences appear to be between 1000 ft and 2000 ft from the area.

Former Range Use

- The area was used by the Army between 1942 and 1945.
- According to a Camp Adair Training Aids General Layout map dated January 1944, Range No. 182 was used for chemical warfare materiel (CWM) recognition and decontamination exercises. Another map lists the area as a gas chamber.
- CWM recognition training was likely to have included the use of "sniff sets" and/or detonation sets.
- "Sniff sets" were several bottles containing small quantities of CWM gases or solids; bottles were opened so that trainees could experience the smell of the specific CWM.
- Detonation sets were several containers holding larger quantities of CWM agents, which were detonated, creating an agent cloud. Trainees would then try to identify the agent based on its odor and other characteristics.
- Decontamination exercises, as documented in historical photos from the camp, involved small sections of wooden floors and walls contaminated by vesicant gas (mustard and lewisite) being treated with a decontaminant solution such as "chloride of lime."
- Other CWM activities documented at Camp Adair, but no specific location has been identified, may have been conducted at the Chemical Identification Area No. 182 include:
    - Decontamination of mustard-contaminated vehicles,
    - Neutralization of chemical land mines, possibly containing mustard filling,
    - Field simulation of a CWM battlefield, in which troops traverse an area, contaminated with a mustard mixture, applying their training skills.
    - Gas mask training using tear gas in gas chambers.

MEC Evaluation

Types of MEC

- The limited quantities of explosive MEC, e.g., blasting caps or detonating cord that may have been used at these locations do not pose a significant risk, as indicated in Table 2.
- The potential for encountering CWM is low. However, if encountered the health risk is high.

MEC Evaluation/Investigation Needed

- No visual reconnaissance or magnetometer sweeps will be conducted to assess the presence of MEC at the Chemical Identification Area No 182. There is no significant risk from MEC at this AOC.

MC Evaluation

Types of MC

- The small quantity of explosive material that may have been used in this area does not pose a significant risk of environmental contamination, as indicated in Table 2.
- Any CWM agents that may have been released in this area would not be expected to have persisted and/or have been released in quantities that would pose a significant risk of environmental contamination.

MC Evaluation/Investigation Needed

- No field investigation is required for the Chemical Identification Area no. 182.

Data Gaps

MEC

- In general, the presence of MEC at Camp Adair is established by past encounters, which are known to have occurred as recently as 2001.
- MEC has not been found within any small arms range AOCs, except Range Complex No. 4 which overlaps the explosive munitions Mortar Range AOC). There is a slight MEC risk associated with the potential for unknown use of explosive MEC at the small arms ranges. Based on past use and the lack of encounters with MEC since closure of Camp Adair, limited reconnaissance surveys could support an SI determination of whether MEC is present or absent.
- MEC has been found at five of six explosive munitions range AOCs. The sixth AOC, Bombing Target No. 1, overlaps Range Complex No. 2, where MEC has been found. If reconnaissance surveys were conducted under this SI, they would not provide a degree of certainty sufficient to demonstrate the absence of MEC. Conservatively, the presence of MEC is considered to be established at all explosive munitions range AOCs.
- MEC has been found at two of three live hand grenade court AOCs. Reconnaissance surveys consistent with the scope of this SI could not definitively demonstrate the absence of MEC at these AOCs. Based on similar histories, the presence of MEC is considered to be established at all three live hand grenade court AOCs.
- MEC has not been found at any practice grenade court AOC. The use of the practice grenade courts was controlled and only munitions containing small amounts of black powder were used. The absence of MEC is considered to be established without the need for reconnaissance.
- MEC in the Chemical Identification Area No. 182 has not been found and the likelihood of finding MEC is considered low, based on controlled used of CWM.

MC

- Analytical data that would demonstrate the presence or absence of MC are lacking at all AOCs. However, at the practice grenade court AOC MC would be limited to rusting metal from grenade bodies and residue from black powder (potassium nitrate, sulfur, and charcoal). At Chemical Identification Area No. 182 release of CWM to the environment would not be expected to persist. Sampling of one or more potentially affected media in all AOCs, except the practice grenade courts and the Chemical Identification Area No. 182 will be completed.
- Existing analytical data collected during the EPA's SSI is not usable for this SI, due to sample numbering differences between the SSI report text and supporting appendices.

Results of the current status of data requirements with respect to MEC and MC for the AOCs located at the former Camp Adair are summarized below:

AOC	Presence or Absence of MEC	Presence or Absence of MC	Proposed Inspection Activities
Small Arms Ranges			
Infiltration Range No. 143	Unknown	Unknown	None – site has been heavily excavated and covered with municipal waste.
Range Complex No. 4	Unknown	Unknown	Reconnaissance for MEC and sample targets. Soil and sediment sampling.
Range Complex No. 5	Unknown	Unknown	Reconnaissance for MEC and sample targets. Soil and groundwater sampling.
Range Complex No. 6	Unknown	Unknown	Reconnaissance for MEC and sample targets. Soil and groundwater sampling.
Skeet Range No. 580	Absent	Unknown	Reconnaissance for sample targets. Soil sampling.
Explosive Munitions Ranges			
Range Complex No. 1	Present	Unknown	Reconnaissance for sample targets. Sample soil, sediment, and groundwater.
Range Complex No. 2	Present	Unknown	Reconnaissance for sample targets. Sample soil, sediment, and groundwater.
Bombing Target No. 1	Present	Unknown	Reconnaissance for sample targets. Sample soil, sediment, and groundwater.
Range Complex No. 3	Present	Unknown	Reconnaissance for sample targets. Sample soil, sediment, and groundwater.
Mortar Range	Present	Unknown	Reconnaissance for sample targets. Sample soil, sediment, and groundwater.
Moving Target Range No. 75	Present	Unknown	Reconnaissance for sample targets. Sample soil, sediment, and groundwater.
Live Hand Grenade Courts			
East Live Hand Grenade Court	Present	Unknown	Reconnaissance for sample targets. Sample soil. Sample groundwater near one of three live hand grenade courts.
West Live Hand Grenade Court	Present	Unknown	Reconnaissance for sample targets. Sample soil. Sample groundwater near one of three live hand grenade courts.

AOC	Presence or Absence of MEC	Presence or Absence of MC	Proposed Inspection Activities
Live Hand Grenade Court No. 129	Present	Unknown	Reconnaissance for sample targets. Sample soil. Sample groundwater near one of three live hand grenade courts.
Practice Grenade Courts			
Practice Grenade Court No. 120	Absent	Absent	Reconnaissance and sampling are not required.
Practice Grenade Court No. 121	Absent	Absent	Reconnaissance and sampling are not required.
Practice Grenade Court No. 122	Absent	Absent	Reconnaissance and sampling are not required.
Practice Grenade Court No. 125	Absent	Absent	Reconnaissance and sampling are not required.
Practice Grenade Court No. 126	Absent	Absent	Reconnaissance and sampling are not required.
Practice Grenade Court No. 127	Absent	Absent	Reconnaissance and sampling are not required.
Chemical Identification Area			
Chemical Identification Area No. 182	Absent	Absent	Reconnaissance and sampling are not required.

Proposed Sampling Scheme

Proposed Field Investigation

The proposed field investigation to be conducted at the former Camp Adair is detailed below. The investigation approach will be defined in more detail in a SSWP that will be submitted to ODEQ and other stakeholders for review. The SSWP will reference technical details including sampling and analytical methods that are described in the *Type I Work Plan, Site Inspections at Multiple Sites*, prepared by Shaw and submitted to USACE as final in February 2006. This document is referred to hereafter as the Work Plan. The following methodologies will generally apply.

Reconnaissance

A visual reconnaissance of selected portions of each AOC will be performed prior to any sampling. The inspection will be conducted by a qualified UXO technician, with the aid of a hand-held magnetometer, to assure that personnel avoid any potential MEC at all times and to select optimal sample locations within the area. Special attention will be given to physical features such as berms or hillsides that may have served as range backstops or impact areas, as well as indications of munitions debris or other objects such as targets that could indicate the potential presence of MC. A global positioning system (GPS) receiver will be used to record discovered MEC, munitions debris, and sample point locations. Digital photographs will be taken to document significant features. At AOCs where MEC has been previously confirmed, reconnaissance transects will not be performed and the reconnaissance objectives are limited to MEC avoidance and sample selection.

At the small arms range AOCs, the reconnaissance will have an additional objective of assessing the presence or absence of MEC within a portion of the AOC. Several transects will be walked through targeted areas during which visual observations and magnetic anomalies will be noted. The path walked will be recorded using GPS, and appropriate features influencing the survey will be noted, such as vegetation density and type, topography, etc. If MEC is found, the qualified UXO technician will attempt to make a determination of the hazard, and appropriate notifications will be made as detailed in the Work Plan and SSWP.

Sampling

Surface soil samples will be collected at a depth of approximately 0 to 6 inches bgs. Surface soil samples will be composite samples (7-point, wheel pattern with 2-foot radius). Sediment samples will be collected from a similar depth but will generally be discrete samples in order to retrieve material from specific, localized, surface water drainage features. Where soil and sediment samples may have been impacted by small arms fire (i.e., the small arms and explosive munitions AOCs), samples will be passed through an ASTM No. 10 (2-mm) wire mesh sieve at the laboratory prior to analysis for lead or selected metals in order to remove coarser particles and foreign objects, including large metallic lead fragments from bullets which have a low degree of bio-availability (Interstate Technical and Regulatory Council, 2003).

Groundwater samples will be collected only from pre-existing wells within or near the AOCs. Generally, it is anticipated that private, domestic water wells will be sampled. Samples for analysis of lead or selected metals will be tested for dissolved lead or metals content.

The proposed sampling for the AOCs at Camp Adair is summarized in Table 3.

Analyses

Samples will be analyzed as follows:

- soil and water samples for lead or selected metals using USEPA SW-846 Method 6020A;
- soil and water samples for explosives using USEPA SW-846 Method 8330A/Modified 8330A;
- soil for PAHs using USEPA SW-846 Method 8270C; and,
- Water for perchlorate using USEPA SW-846 Method 6850.

Background Sampling

A total of sixteen background samples (ten soil, three sediment, and three groundwater) will be collected from locations that are believed to be unaffected by munitions activity. All background samples will be analyzed for selected metals. In addition to selected metals, groundwater samples will be analyzed for perchlorate.

TPP Notes and Data Quality Objectives

Site Inspection
Camp Adair/Adair Air Force Station

Technical Project Planning Meeting
April 5, 2006

Technical Project Planning and Development of Data Quality Objectives

- The USACE TPP process is a four-phase process:
  - Identify the current project;
  - Determine data needs;
  - Develop data collection options; and
  - Finalize data collection program.
- The purpose of TPP is to develop DQOs that document how the project makes decisions.
- DQOs are intended to capture project-specific information such as the intended data use(s), data needs, and how these items will be achieved.
- Information captured through DQOs will be used as a benchmark for determining whether identified objectives are met.

TPP Phases

Phase I: Identify the Current Project

1. Team members identified to date include: USACE – representatives from the Omaha District Military Munitions Design Center, and the Seattle District; Shaw Environmental, Inc. as a USACE contractor; and ODEQ.

   Question: Is there any person or organization missing from this Team?

   Additional stakeholders identified were:

   Oregon National Guard, Benton County, U.S. Forest Service, Oregon Department of Fish and Wildlife, Polk County, and Oregon State University Departments of Forestry and Agriculture.

2. The AOCs are identified as:

   Small Arms Range AOCs – Ranges where only small arms, up to .50 caliber, were used.

   - Infiltration Range No. 143
   - Range Complex No. 4
   - Range Complex No. 5
   - Range Complex No. 6
   - Skeet Range No. 580

Explosive Munitions Range AOCs – Ranges where explosive munitions were used excluding grenade courts.

- Range Complex No. 1
- Range Complex No. 2
- Bombing Target No. 1
- Range Complex No. 3
- Mortar Range
- Moving Target Range No. 75

Live Hand Grenade Court AOCs – Ranges dedicated to grenade training using live hand grenades.

- East Live Hand Grenade Courts
- West Live Hand Grenade Courts
- Live Hand Grenade Court No. 129

Practice Grenade Court AOCs – Ranges dedicated to grenade training using training or practice hand grenades.

- Practice Grenade Court No. 120
- Practice Grenade Court No. 121
- Practice Grenade Court No. 122
- Practice Grenade Court No. 125
- Practice Grenade Court No. 126
- Practice Grenade Court No. 127

Chemical Identification Area AOC – An area used for training in the identification and decontamination of chemical agents.

- Chemical Identification Area No. 182

Question: Are there any other AOCs to be identified?

Three locations where MEC was found within or near the cantonment area are identified in the ASR. These items are considered anomalous and may have been transported from their original location of discovery. An AOC is not identified based on this MEC.

3. Based on information available about the site and shared through discussions with USACE, concerns about this area have been expressed by the ODEQ, as well as by local residents (who have discovered and reported MEC).

Question: Are there additional concerns or issues from landowners or other stakeholders regarding the Camp Adair area?

None identified.

Question: Are there any administrative or stakeholder concerns or constraints that would prevent site inspection activities from going forward on the decision path for this site?

None identified.

Phase II: Determine Data Needs

4. Existing site information includes an ASR and ASR Supplement both prepared by the USACE in 2001 and 2004, respectively. Regional hydrogeology is characterized in Conlon, T.D., K.C. Wozniak, D. Woodcock, N.B. Herrera, B.J. Fisher, D.S. Morgan, K.K. Lee, and S.R. Hinkle, 2005, *Ground-Water Hydrology of the Willamette Basin, Oregon*, U.S. Geological Survey, Scientific Investigations Report 2005-5168.

   Question: Are there any other pertinent documents relating to the site available?

   USEPA Screening Site Inspection for Camp Adair, Corvallis, Oregon (USEPA, 1996).

5. The site-specific approach for this SI involves collating and assessing available site information, to include site geology, hydrogeology, groundwater, surface water, ecological information, human use/access, and current and future land uses; as well as considering conduct of site inspection and sampling activities.

   Question: Are there any other site aspects/information that should be considered?

   None identified.

6. Based on prior site investigations, soil is the primary affected medium at Camp Adair. Surface water is a potential pathway of MC. Groundwater is also a potential pathway and is likely to discharge to surface water in major streams. Air is a potential pathway if soil particles become airborne; screening values for soil will be used that are protective of this pathway. Considering current and future land use, receptors of any contaminants that may be present could include residents, workers, recreational users, livestock, and wildlife.

   Question: Do team members concur with the CSM?

   - **Practice grenade courts and Chemical Identification Area No. 182 do not require field investigations.**
   - **MEC and MC will be evaluated at small arms range AOCs.**

- **MC will be evaluated at explosive munitions ranges and live hand grenade courts; the presence of MEC at these AOCs is known based on past encounters with MEC.**

No changes were requested at TPP meeting.

7. Technical considerations and/or constraints need to be identified and addressed before conducting any additional sampling, and would depend on the approach and additional data needs decided upon by team members.

Questions:

- **Are any data missing?**
- **What is the nature of needed data?**
- **What data gaps would additional data meet for making a decision about the site?**
- **Are there any considerations/constraints that need to be addressed for collecting additional data?**

None identified.

Phase III: Develop Data Collection Options

8. Proposed approach:

    1. Find suitable background sample locations and sample.
    2. Conduct reconnaissance surveys for MEC and sample at small arms range AOCs.
    3. Conduct reconnaissance for sampling and collect samples at explosive munitions range and live hand grenade court AOCs.

Question: Based on the desired decision endpoints and information known to date, what additional information is needed to reach a determination of No Department of Defense Action Indicated (NDAI) or further action?

None identified.

Question: Are the stakeholders in agreement with the sampling approach program?

Yes, in general; however, ODEQ will provide additional input.

Question: Are the stakeholders in agreement with the proposed approach for collecting background data?

Yes, in general; however, ODEQ will provide additional input.

Phase IV: Finalize Data Collection Program

9. What concentrations of COCs lead to decision end-points?
   Note: Proposed standards and other screening values are provided in Tables 4, 5, 6, 7, and 8.

   Question: Are these the correct standards to be applied as screening values for human health and ecological risk assessment?

   Tables have been revised based on input from ODEQ at the TPP meeting. ODEQ will provide additional guidance screening levels to be used. Levels to be provided are not yet official but will be in the near future. ODEQ is agreeable to scaling back the number of metals from full TAL list.

   Default values are EPA Region 9 PRGs. ODEQ stated that risk action levels are 10^{-6} for individual contaminants and 10^{-5} for cumulative effects. They do not use a 10^{-4} to 10^{-6} risk management range.

   Level II ecological screening should be used.

   Question: To what extent are both total and leachate analytical results for metals (or lead) required to assess MC in soils and sediment?

   Only total metals are required to address MC, i.e., "leachate concentrations" that were presented in the draft tables do not apply.

   Question: Are there any additional sampling and analysis methodologies needed for all team members to arrive at a decision end-point?

   None identified.

10. Assuming that additional data are needed for the former Camp Adair FUDS SI, it is important for all team members to agree with the sampling strategy and analysis.

    Question: Given the additional sampling and analysis methodologies, are there impacts to the project schedule that need to be accommodated?

    None identified.

Data Quality Objectives

At the TPP meeting, it was agreed that the following decision rules would be applied with regard to MC sampling results.

- Below risk-based screening levels = NDAI;
- Above risk-based screening levels and background = RI/FS.

The following expanded project objectives have been developed.

Objective 1: Determine if the site requires additional investigation or can be recommended for NDAI based on the presence or absence of MEC.

DQO #1 – At the AOCs where MEC has been reported in the past, trained UXO personnel will conduct a visual search of the small arms range AOCs using handheld magnetometers, searching for physical evidence of MEC (e.g., craters and ground scars indicative of OB/OD activities, MEC on the surface, munitions debris indicative of OB/OD activities, and soil discoloration indicative of explosives). The visual search will consist of a meandering path survey along trails and in accessible areas. The following decision rules will apply:

- If no evidence of MEC is found, the AOCs will be recommended for NDAI relative to MEC.
- If evidence of MEC is confirmed, the AOCS will be recommended for additional investigation.
- If there is indication of an imminent MEC hazard, the site may be recommended for a time-critical removal action (TCRA).

DQO #2 – At AOCs where MEC has been reported in the past (explosive munitions ranges and live hand grenade courts), the following decision rules will apply:

- The presence of MEC is confirmed on the basis of past finds, and these areas will be recommended for additional investigation.
- If, in the course of reconnaissance for sample targets and/or UXO avoidance, there is indication of an imminent MEC hazard, the site may be recommended for a TCRA.

Objective 2: Determine if the site requires additional investigation or can be recommended for NDAI based on the presence or absence of MC above screening values.

DQO#3 – Soil, sediment, and groundwater samples will be collected and analyzed as proposed in Table 3. Analytical results will be compared to screening values for human health and ecological risk assessment, and to background values for naturally occurring substances. The following decision rules will apply:

- If sample results are less than human health and ecological screening values, the site will be recommended for NDAI relative to MC.
- If sample results exceed both human health screening values and background values, the site will be recommended for additional investigation.
- If sample results do not exceed human health screening values but do exceed both ecological screening values and background values, additional evaluation of the data will

be conducted in conjunction with the stakeholders to determine if additional investigation is warranted.

Objective 3: Obtain data required for HRS scoring.

Data required for HRS scoring are identified in the HRS Data Gaps worksheet.

Objective 4: Obtain data required for MRSPP ranking.

Data required for MRSPP ranking are identified in the MRSPP worksheet.

Next Steps

- Shaw will prepare the TPP Memorandum and distribute for concurrence.
- Shaw will prepare the SSWP for review and comment.
- Shaw will collect samples.
- Shaw will prepare the SI Report.

Figures

DRAWING NUMBER: CampAdair_001_fig01_siteLayout

DRAWN BY: K. Masterson 2/28/06

OFFICE: mnrvl

123°24'0"W 123°18'0"W 123°12'0"W 44°48'0"N 44°42'0"N

Monmouth Powell Main Polk Marine Park River Riverside Corvallis MarionCounty PolkCounty Skyline Valley Kings Valley Buena Vista Albot BentonCounty Springhill Conser LinnCounty

A-27 A-38 A-63 A-63 Lewisville Cemetary BOMBING TARGET NO. 1 RANGE COMPLEX NO. 2 RANGE COMPLEX NO. 3 Sarah Helmick State Park RANGE COMPLEX NO. 1 LIVE HAND GRENADE COURT NO. 129 WEST LIVE HAND GRENADE COURT EAST LIVE HAND GRENADE COURT PRACTICE GRENADE COURTS NO.s 125, 126, 127 CHEMICAL IDENT AREA NO. 182 MOVING TARGET RANGE NO. 75 RANGE COMPLEX NO. 4 RANGE COMPLEX NO. 5 E.E. Wilson Wildlife Refuge INFILTRATION RANGE NO. 143 MORTAR RANGE PRACTICE GRENADE COURTS NO. 120, 121, 122 RANGE COMPLEX NO. 6 SKEET RANGE NO. 580 99 North Albany Park Benton Gibson Hill Takena Landing

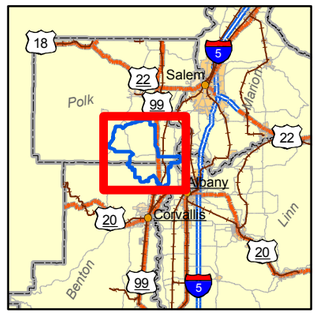
Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Impact Areas
- State
- Privately Owned Land
- Bureau of Land Management
- Reported MEC Find
- Target Center

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.

N

0 0.5 1 2 Miles



REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

FIGURE 1

SITE LAYOUT

CAMP ADAIR

Shaw® Shaw Environmental, Inc.

OFFICE mnrvl | DRAWN BY K. Masterson 2/28/06 | DRAWING NUMBER CampAdair_002_fig02_siteLayout

Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Township and Range
- 4 Section Line (No. Wells in Section)
- Well (Source: USGS)

Sectionalized Township
Section Number

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.

N

0 0.5 1 2
Miles

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

FIGURE 2

WATER WELL DATA

CAMP ADAIR

Shaw Shaw Environmental, Inc.

OFFICE	DRAWN BY		DRAWING NUMBER
mnrvl	K. Masterson	04/25/06	CampAdair_003_fig03_IR143

RANGE COMPLEX NO. 5 - 1000 IN LANDSCAPE RANGE NO. 35, 36, 37

RANGE COMPLEX NO. 5 - 1000 IN PISTOL RANGE NO. 15

RANGE COMPLEX NO. 5 - 1000 IN ANTI TANK RANGE NO. 40, 41

RANGE COMPLEX NO. 5 - 1000 IN ANTI TANK RANGE NO. 45, 46

RANGE COMPLEX NO. 5

RANGE COMPLEX NO. 5

RANGE COMPLEX NO. 5 - 1000 IN MG RANGE NO. 20, 21, 22, 23

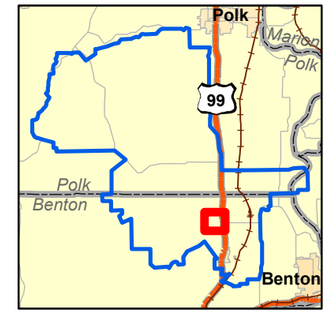
VALLEY LANDFILLS INC

INFILTRATION RANGE NO. 143

Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Taxlot Parcel
- Reported MEC Find
- Well (Source: USGS)

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.



N

0 500 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

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OMAHA DESIGN CENTER

FIGURE 3
SMALL ARMS RANGES
INFILTRATION RANGE NO. 143
CAMP ADAIR

Shaw® Shaw Environmental, Inc.

OFFICE	DRAWN BY	DRAWING NUMBER
MNRVL	K.Masterson 04/25/06	CampAdair_004_fig04_rc4

LIVE HAND GRENADE COURT NO. 129

RANGE COMPLEX NO. 1

RANGE COMPLEX NO. 2

WEST LIVE HAND GRENADE COURT

EAST LIVE HAND GRENADE COURT

PRACTICE GRENADE COURT NO. 127

MOVING TARGET RANGE NO. 75

CHEMICAL IDENT. AREA NO. 182

RANGE COMPLEX NO. 4

RANGE COMPLEX NO. 5

INFILTRATION RANGE NO. 143

RANGE COMPLEX NO. 6

MORTAR RANGE

SKEET RANGE NO. 580

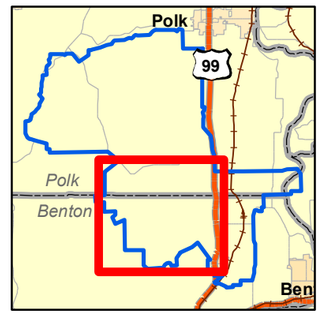
Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Public Land (2003)
- National Guard Facility
- Reported MEC Find
- Well (Source: USGS)
- Proposed Sediment Sample Location
- Proposed Soil Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.

N

0 3,000 Feet



REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

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OMAHA DESIGN CENTER

FIGURE 4
SMALL ARMS RANGES
RANGE COMPLEX NO. 4
CAMP ADAIR

Shaw® Shaw Environmental, Inc.

DRAWING NUMBER: CampAdair_004a_fig04a_RC4n

DRAWN BY: K.Masterson 2/28/06

OFFICE: mnrvl

ANTI AIRCRAFT RANGE NO. 70

RANGE COMPLEX NO. 2

WEST LIVE HAND GRENADE COURT

TRANSITION COURSE NO. 160

MOVING TARGET RANGE NO. 75

THOMPSON SUB MG RANGE NO. 50A

INFILTRATION RANGE NO. 141

KNOWN DISTANCE RIFLE RANGE NO. 4

CLOSE COMBAT COURSE NO. 170

FIELD COMBAT RANGE NO. 81

POLK CO

BENTON CO

Legend

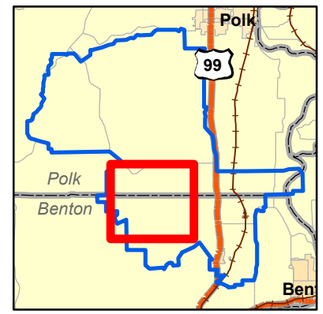
- Camp Adair Installation Area
- Camp Adair AOCs
- Parcel
- National Guard Facility
- Public Land (2003)
- Target Center (1944 Air Photo)
- Reported MEC Find
- Well (Source: USGS)
- Proposed Sediment Sample Location
- Proposed Soil Sample Location

NOTES:

1) AOC Boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.

N

0 2,000 Feet



REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

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OMAHA DESIGN CENTER

FIGURE 4A
SMALL ARMS RANGES
RANGE COMPLEX NO. 4 - NORTH
CAMP ADAIR

Shaw® Shaw Environmental, Inc.

OFFICE	DRAWN BY		DRAWING NUMBER
mnrvl	K.Masterson	2/28/06	CampAdair_004B_fig04B_rc4

FIELD COMBAT RANGE NO. 80A

FIELD COMBAT RANGE NO. 80B

KNOWN DISTANCE RIFLE RANGE NO. 3

KNOWN DISTANCE RIFLE RANGE NO. 2

KNOWN DISTANCE RIFLE RANGE NO. 1

RANGE COMPLEX NO. 5

INFILTRATION RANGE NO. 143

MINI A-A RANGE 65, 66, 67

MINI A-A RANGE 60, 61, 62

FIELD COMBAT RANGE NO. 80

MORTAR RANGE

THOMPSON SUB MG RANGE NO. 50

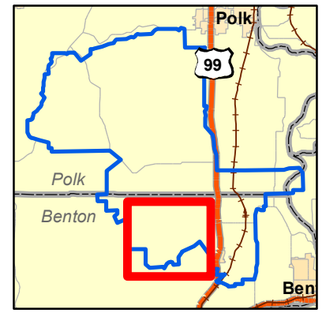
Legend

- Camp Adair Installation Area
- Public Land (2003)
- Parcel
- National Guard Facility
- Reported MEC Find
- Camp Adair AOCs
- Well (Source: USGS)
- Proposed Sediment Sample Location
- Proposed Soil Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.

N

0 2,000 Feet



REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

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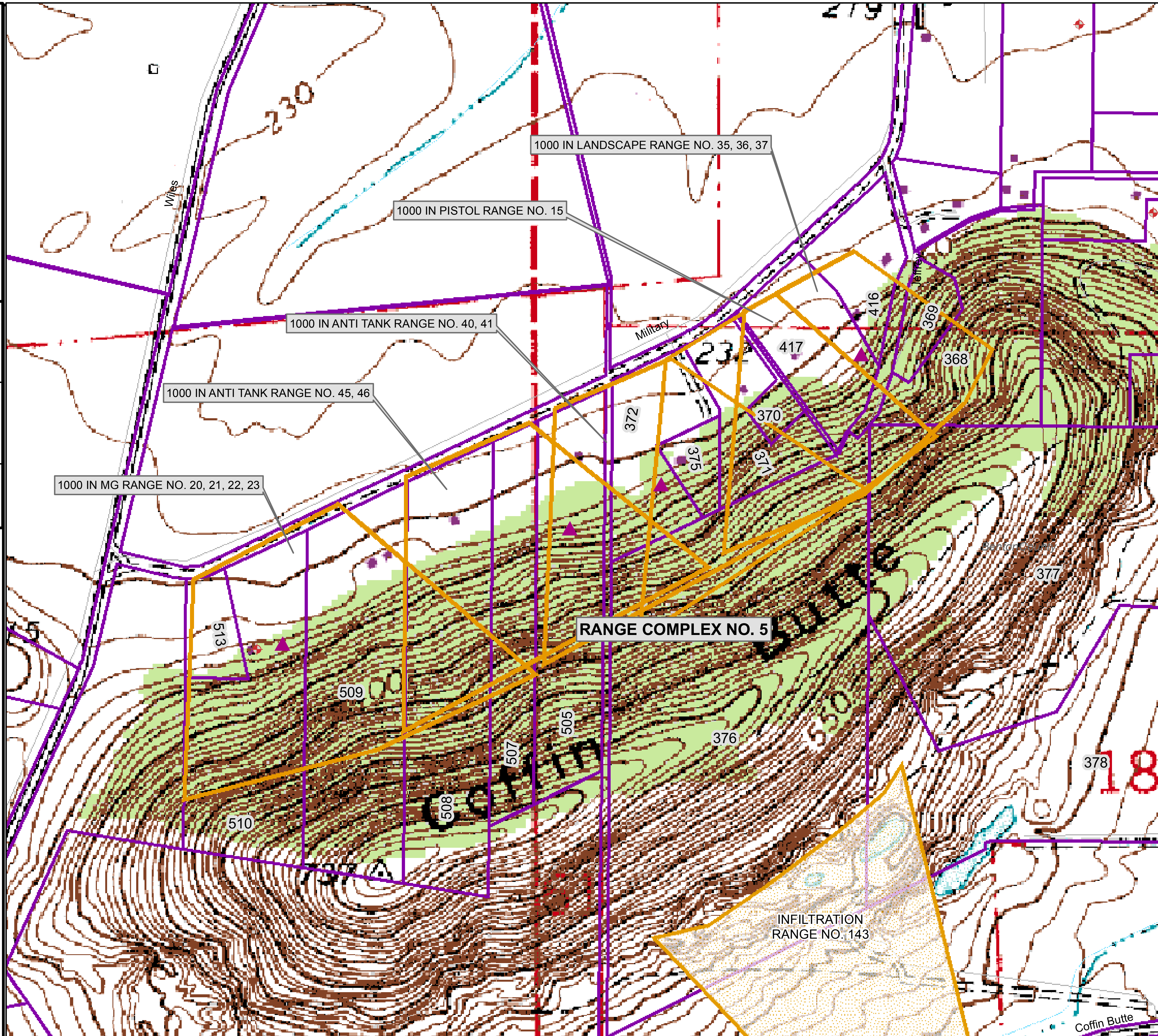
OMAHA DESIGN CENTER

FIGURE 4B
SMALL ARMS RANGES
RANGE COMPLEX NO. 4 - SOUTH
CAMP ADAIR

Shaw Environmental, Inc.



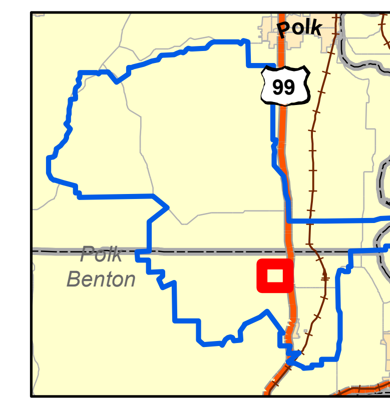
Legend

- Camp Adair AOCs
- Camp Adair Installation Area
- Taxlot Parcel
- Public Land (2003)
- Reported MEC Find
- Well (Source: USGS)
- Proposed Sediment Sample Location
- Proposed Soil Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.

0 500 Feet

N



REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

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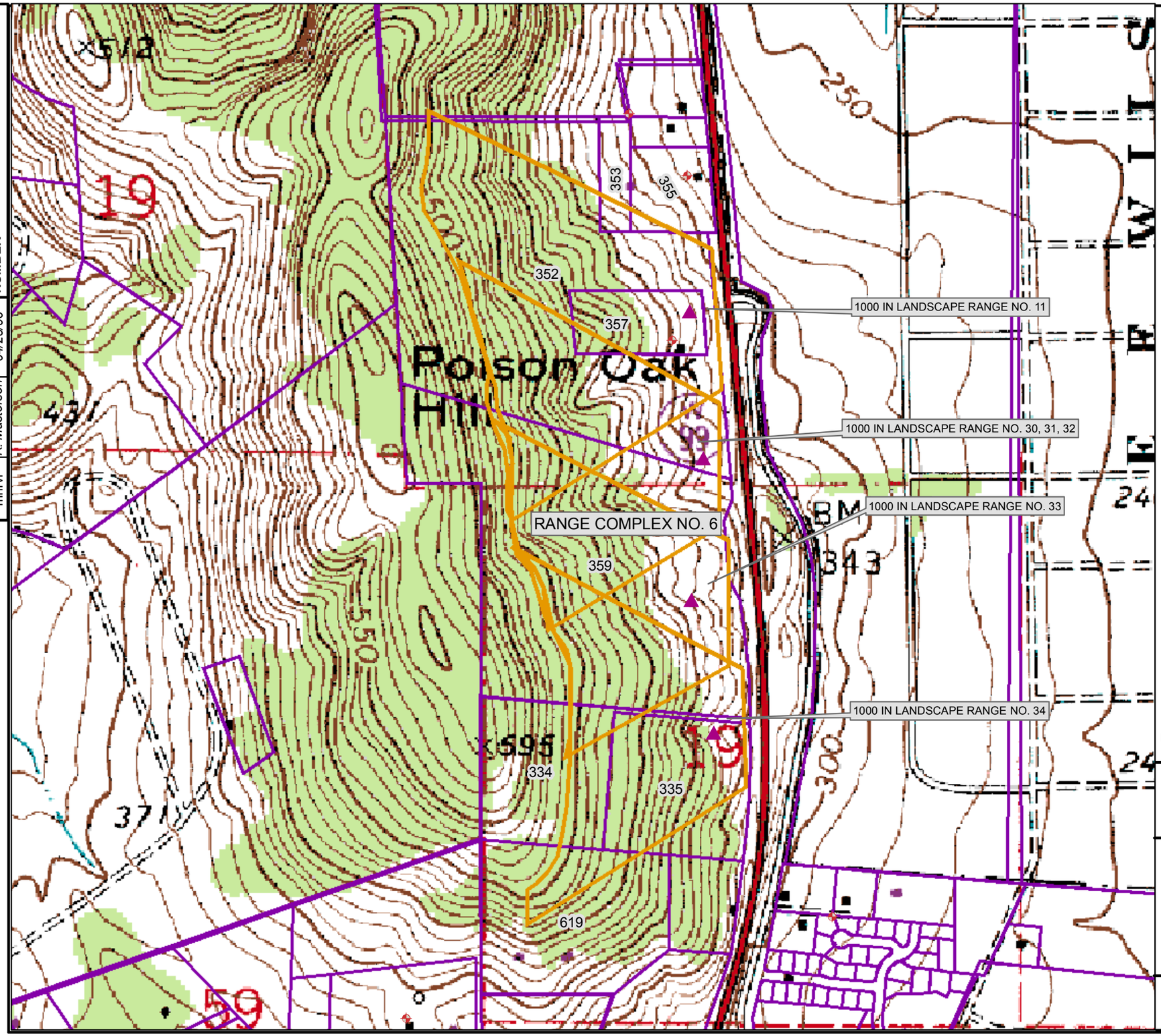
FIGURE 5
SMALL ARMS RANGES
RANGE COMPLEX NO. 5
CAMP ADAIR

Shaw® Shaw Environmental, Inc.

OFFICE	DRAWN BY		DRAWING NUMBER
MNRVL	K. Masterson	04/25/06	CampAdair_005_fig05_RC5

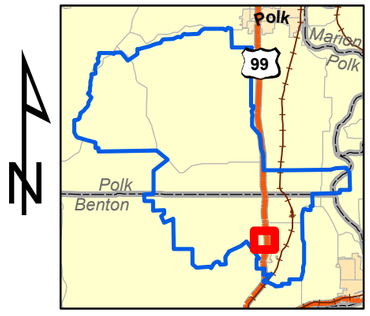
OFFICE: mnrvl
DRAWN BY: K. Masterson 04/25/06
DRAWING NUMBER: CampAdair_006_fig06_RC6



Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Taxlot Parcel
- Public Land (2003)
- Reported MEC Find
- Well (Source: USGS)
- Proposed Soil Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.



0 500 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

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FIGURE 6
SMALL ARMS RANGES
RANGE COMPLEX NO. 6
CAMP ADAIR

Shaw Environmental, Inc.

DRAWING NUMBER: CampAdair_007_fig07_SK580

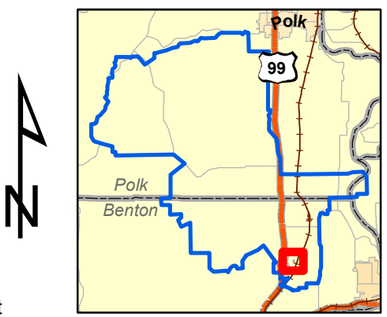
DRAWN BY: K.Masterson 04/25/06

OFFICE: MNRVL

Legend

- Camp Adair Installation Area
- Camp Adair AOC
- Taxlot Parcel
- Public Land (2003)
- Reported MEC Find
- Well (Source: USGS)
- Proposed Soil Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.
4) Aerial photo from TerraServer, dated July 30, 2000.



0 500 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

FIGURE 7
SMALL ARMS RANGES
SKEET RANGE NO. 580
CAMP ADAIR

Shaw® Shaw Environmental, Inc.

DRAWING NUMBER: CampAdair_008_fig08_RC1_RC2_bt1

DRAWN BY: K. Masterson 04/25/2006

OFFICE: mnrvl

RANGE COMPLEX NO. 3

RANGE COMPLEX NO. 2

RANGE COMPLEX NO. 1

BOMBING TARGET NO. 1

LIVE HAND GRENADE COURT NO. 129

WEST LIVE HAND GRENADE COURT

EAST LIVE HAND GRENADE COURT

RANGE COMPLEX NO. 4

A-27

A-38

A-63

Monmouth

Shady Lane

Fishback

Homestead

Zumwalt

Lamers

Stapleton Field

Smithson

Cooper Creek

Little Luckiamute River

Luckiamute River

Brateng

Parker

Elkins

Priem

Maple Grove

Doll

Simpson

Dry Creek

Sauerkraut

Rolling Hills

Helmick

99

Fort

Helmick State Park

Staats

Tarter

Airlie

Peterson Creek

Bunker and Craters

Maxfield Creek

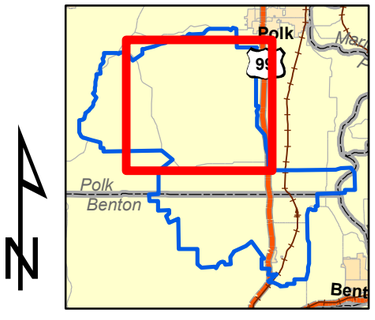
PolkCounty

Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Impact Areas
- Public Land (2003)
- Target Center
- Reported MEC Find
- Well (Source: USGS)
- Proposed Sediment Sample Location
- Proposed Soil Sample Location

NOTES:

1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.



0 3,500 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

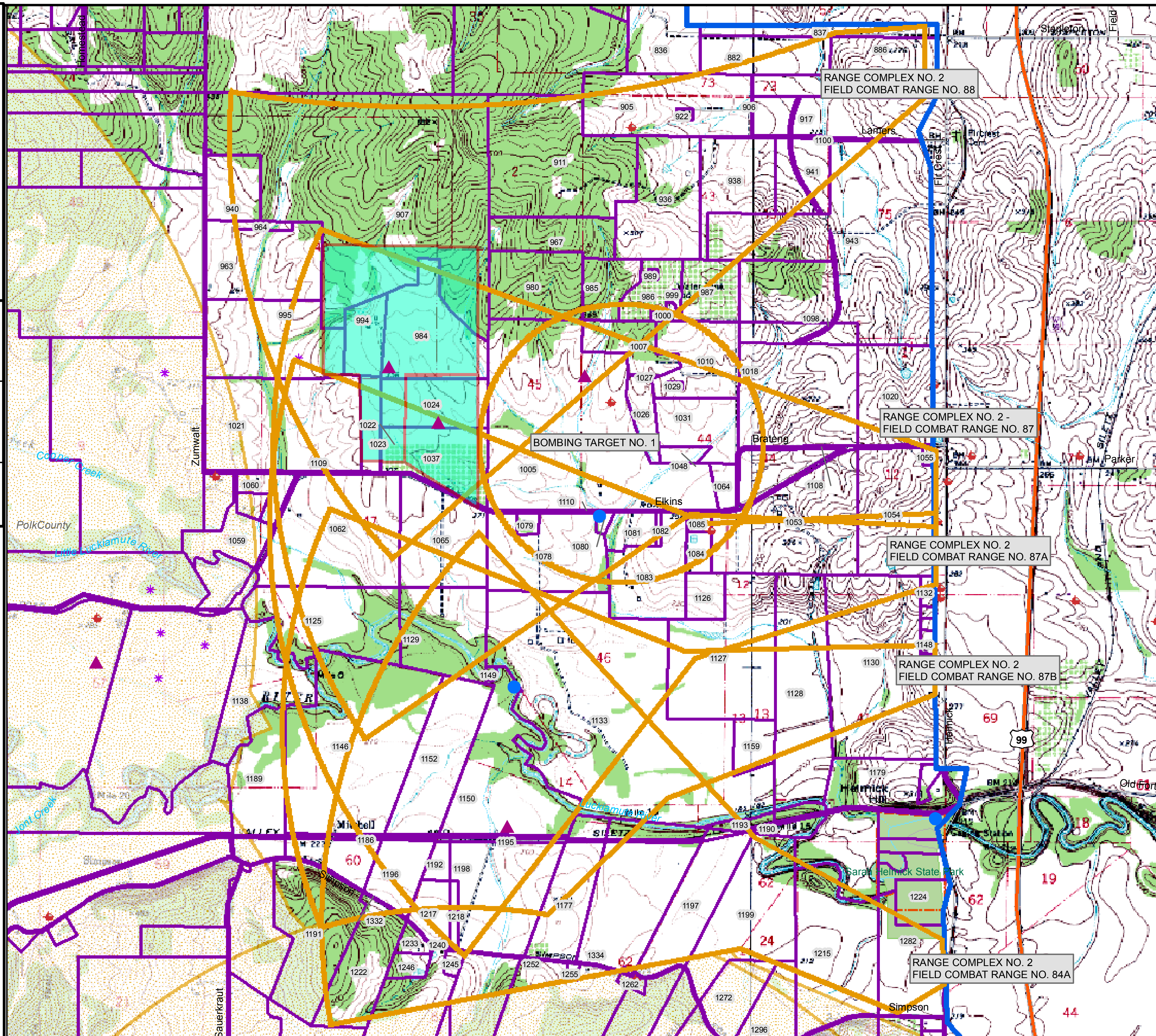
FIGURE 8

**EXPLOSIVE MUNITION RANGES
RANGE COMPLEXES NO. 1 and NO. 2
AND BOMBING TARGET NO. 1**

CAMP ADAIR

Shaw Environmental, Inc.

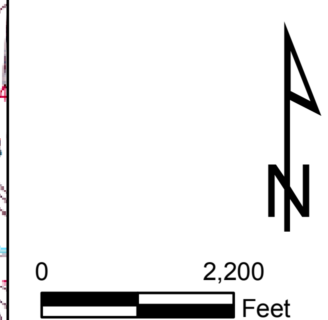
OFFICE	DRAWN BY		DRAWING NUMBER
mnrvl	K.Masterson	04/25/06	CampAdair_008a_fig08a_RC1ne

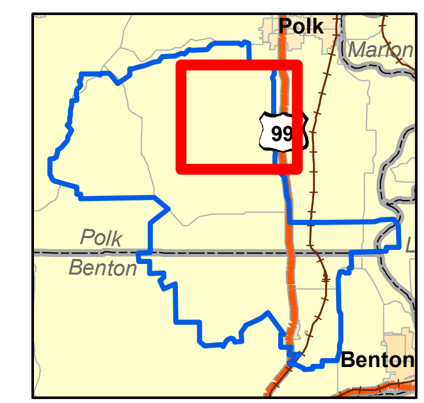


Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Impact Areas
- Taxlot Parcel
- Public Land (2003)
- Reported MEC Find
- Well (Source: USGS)
- Proposed Sediment Sample Location
- Proposed Soil Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.





REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

FIGURE 8A

EXPLOSIVE MUNITIONS RANGES
RANGE COMPLEXES NO. 1 and 2 (NORTHEAST)

CAMP ADAIR

Shaw® Shaw Environmental, Inc.

OFFICE	DRAWN BY		DRAWING NUMBER
CEN	K. Masterson	04/25/06	CampAdair_008b_fig08b_RC2se

RANGE COMPLEX NO. 2

RANGE COMPLEX NO. 2

RANGE COMPLEX NO. 2
FIELD COMBAT RANGE NO. 84

RANGE COMPLEX NO. 1
BOMBING TARGET NO. 2

RANGE COMPLEX NO. 2
FIELD COMBAT RANGE NO. 85

RANGE COMPLEX NO. 1
FORTIFIED TRAINING AREA NO. 76

LIVE HAND GRENADE COURT NO. 129

RANGE COMPLEX NO. 2
INFILTRATION RANGE NO. 142

RANGE COMPLEX NO. 2
FIELD COMBAT RANGE NO. 51

RANGE COMPLEX NO. 2
FIELD COMBAT RANGE NO. 83

WEST LIVE HAND GRENADE COURT

EAST LIVE HAND GRENADE COURT

RANGE COMPLEX NO. 4

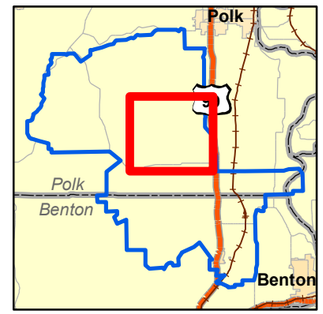
Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Taxlot Parcel
- Public Land (2003)
- Target Center
- Reported MEC Find
- Well (Source: USGS)
- Proposed Sediment Sample Location
- Proposed Soil Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.

N

0 2,000 Feet



REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

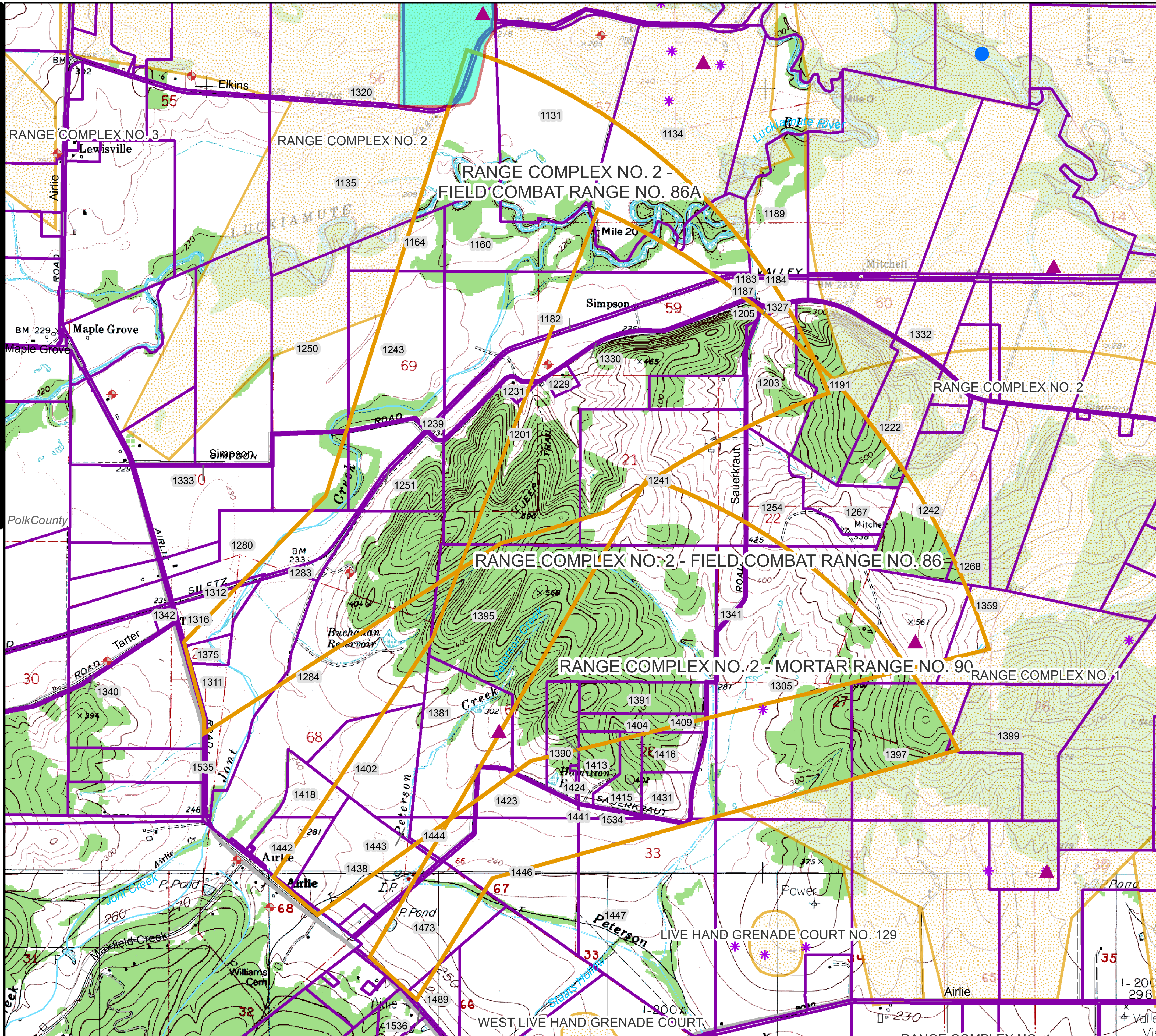
FIGURE 8B

EXPLOSIVE MUNITION RANGES
RANGE COMPLEXES NO. 1 and 2 (SOUTHEAST)

CAMP ADAIR

Shaw® Shaw Environmental, Inc.

DRAWING NUMBER: CampAdair_008C_fig08C_RC2sw
DRAWN BY: K. Masterson 04/25/06
OFFICE: mnrvl



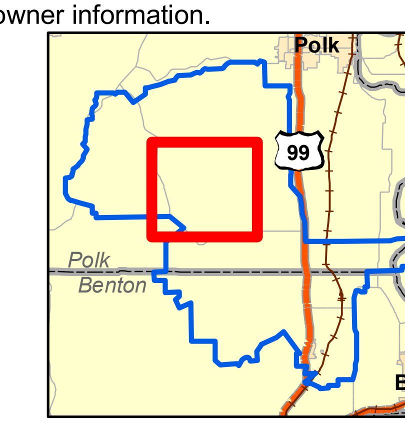
Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Impact Areas
- Taxlot Parcel
- Public Land (2003)
- Dudded Impact Point
- Well (Source: USGS)
- Proposed Sediment Sample Location
- Proposed Soil Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.
4) See parcel table for owner information.

N

0 2,000 Feet



REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

FIGURE 8C

EXPLOSIVE MUNTION RANGES
RANGE COMPLEX NO. 2 (SOUTHWEST)

CAMP ADAIR

Shaw® Shaw Environmental, Inc.

DRAWING NUMBER: CampAdair_008d_fig08d_RC2nw

DRAWN BY: K. Masterson 3/13/06

OFFICE: mnrvl

RANGE COMPLEX NO. 2
FIELD COMBAT RANGE NO. 89B

RANGE COMPLEX NO. 2
MOVING TARGET RANGE NO. 79B

RANGE COMPLEX NO. 2
MOVING TARGET RANGE NO. 79A

RANGE COMPLEX NO. 3

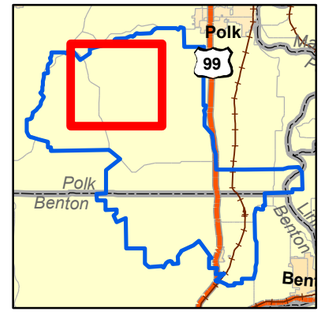
RANGE COMPLEX NO. 2

Legend

- Camp Adair Installation Area
- Camp Adair AOC
- Impact Areas
- Taxlot Parcel
- Public Land (2003)
- Reported MEC Find
- Well (Source: USGS)
- Proposed Sediment Sample Location
- Proposed Soil Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.

0 2,200 Feet



REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

FIGURE 8D
EXPLOSIVE MUNTION RANGES
RANGE COMPLEX NO. 2 (NORTHWEST)
CAMP ADAIR

Shaw® Shaw Environmental, Inc.

OFFICE	DRAWN BY	DRAWING NUMBER
MNRVL	K. Masterson 04/25/06	CampAdair_009_fig09_RC3

FIELD COMBAT RANGE NO. 89C

FIELD COMBAT RANGE NO. 89

FIELD COMBAT RANGE NO. 89A

979 997 1004 1038 1040 1043 1047 1089 1090 1121 1124 1087 1093 1136 1137 1156 1161 1162 1548 1170 1173 1227

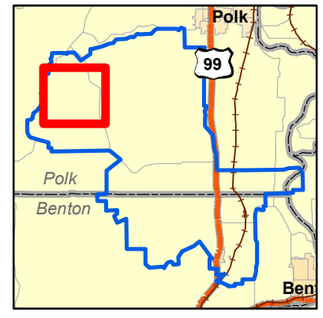
Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Taxlot Parcel
- Reported MEC Find
- Well (Source: USGS)
- Proposed Sediment Sample Location
- Proposed Soil Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.

N

0 1,500 Feet



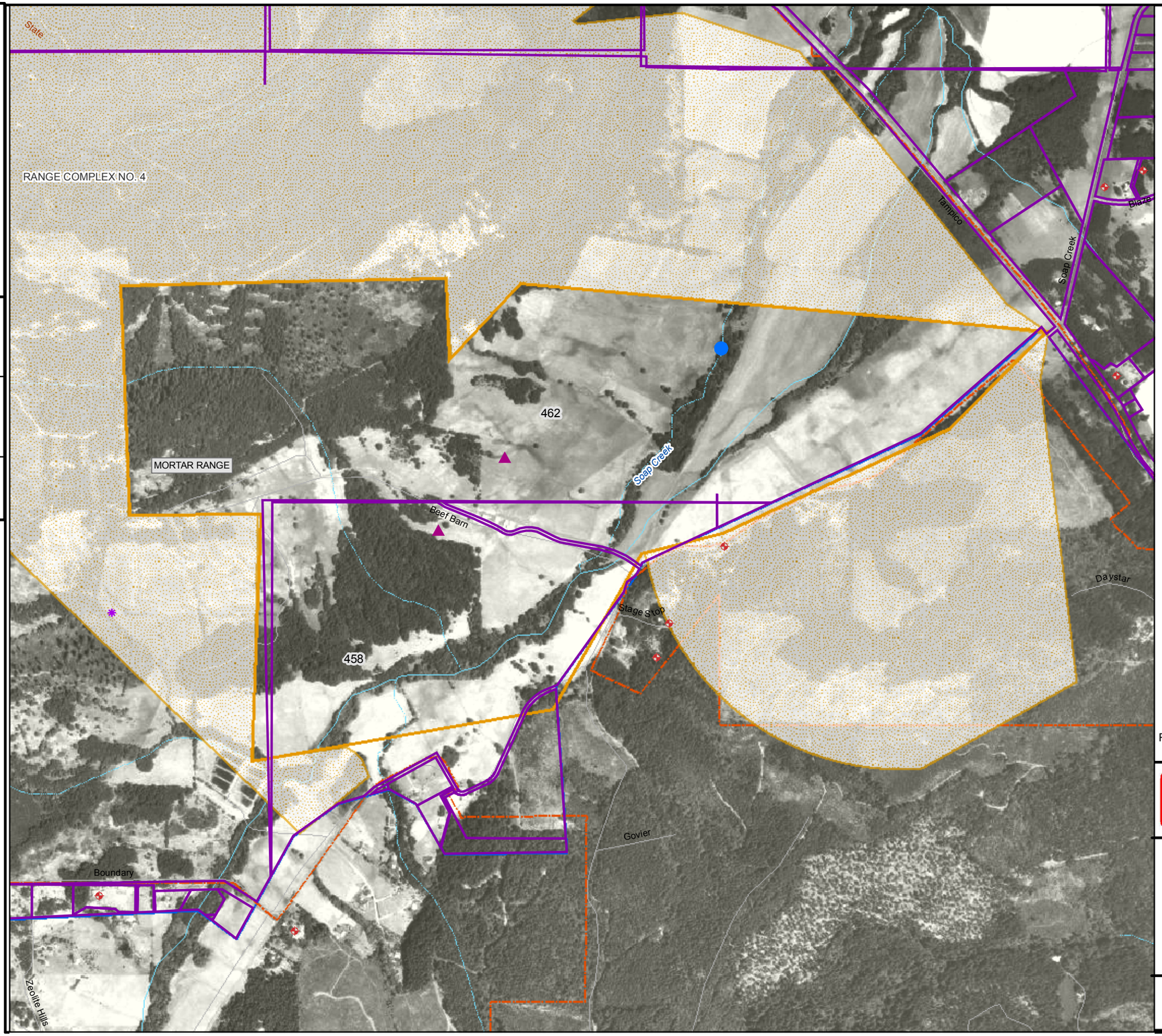
REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

FIGURE 9
EXPLOSIVE MUNTION RANGES
RANGE COMPLEX NO. 3
CAMP ADAIR

Shaw Shaw Environmental, Inc.

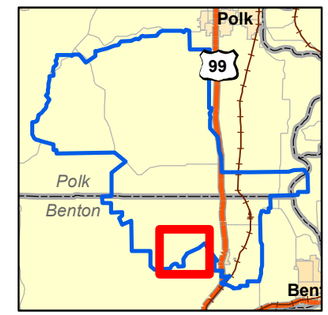
OFFICE	DRAWN BY		DRAWING NUMBER
mnrvl	K. Masterson	3/15/06	CampAdair_010_fig10_MR



Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Public Land (2003)
- Taxlot Parcel
- Reported MEC Find
- Well (Source: USGS)
- Proposed Sediment Sample Location
- Proposed Soil Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.
4) Aerial photo from TerraServer, dated July 30, 2000.



0 1,200 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

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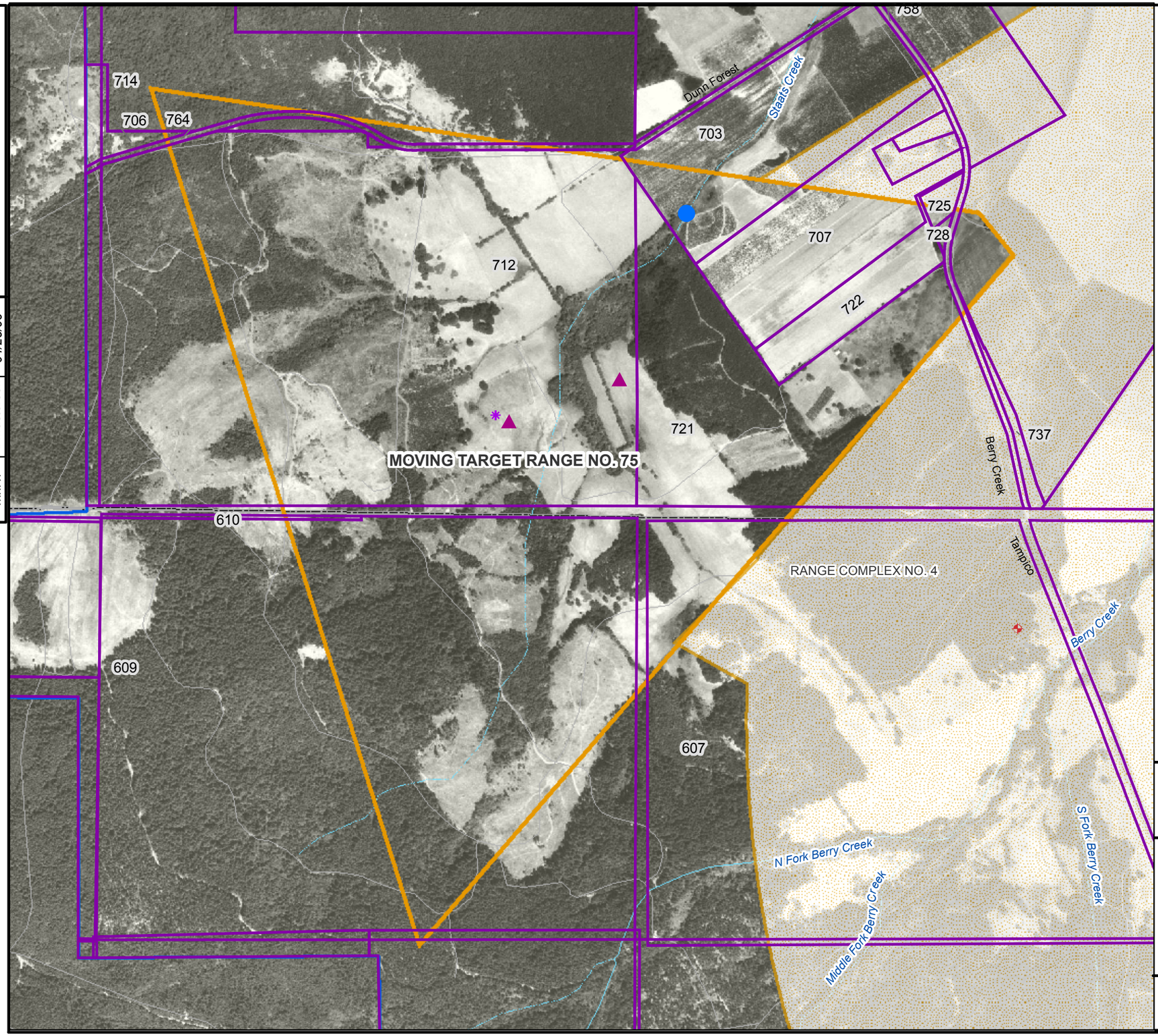
OMAHA DESIGN CENTER

FIGURE 10
EXPLOSIVE MUNITION RANGES
MORTAR RANGE
CAMP ADAIR

Shaw® Shaw Environmental, Inc.

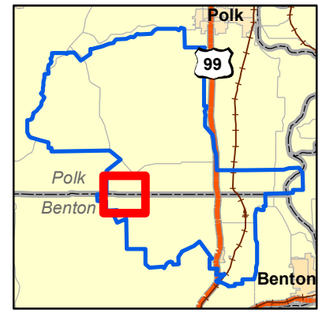
OFFICE	DRAWN BY	DRAWING NUMBER
mnrvl	K. Masterson 04/25/06	CampAdair_011_fig11_MTR75



Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Taxlot Parcel
- Reported MEC Find
- Well (Source: USGS)
- Proposed Soil Sample Location
- Proposed Sediment Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.
4) Aerial photo from TerraServer, dated July 30, 2000.



0 1,000 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

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OMAHA DESIGN CENTER

FIGURE 11
EXPLOSIVE MUNITION RANGES
MOVING TARGET RANGE NO. 75
CAMP ADAIR

Shaw® Shaw Environmental, Inc.

DRAWING NUMBER: CampAdair_012_fig12_ELHG

DRAWN BY: K. Masterson 04/25/06

OFFICE: MNRVL

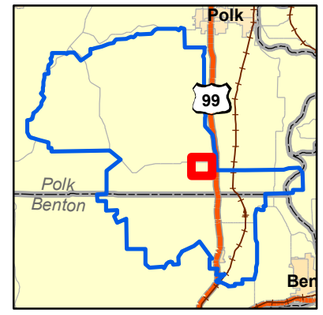
Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Public Land (2003)
- Taxlot Parcel
- Reported MEC Find
- Well (Source: USGS)
- Proposed Sediment Sample Location
- Proposed Soil Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.
4) Aerial photo from TerraServer, dated July 30, 2000.

N

0 500 Feet



REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

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OMAHA DESIGN CENTER

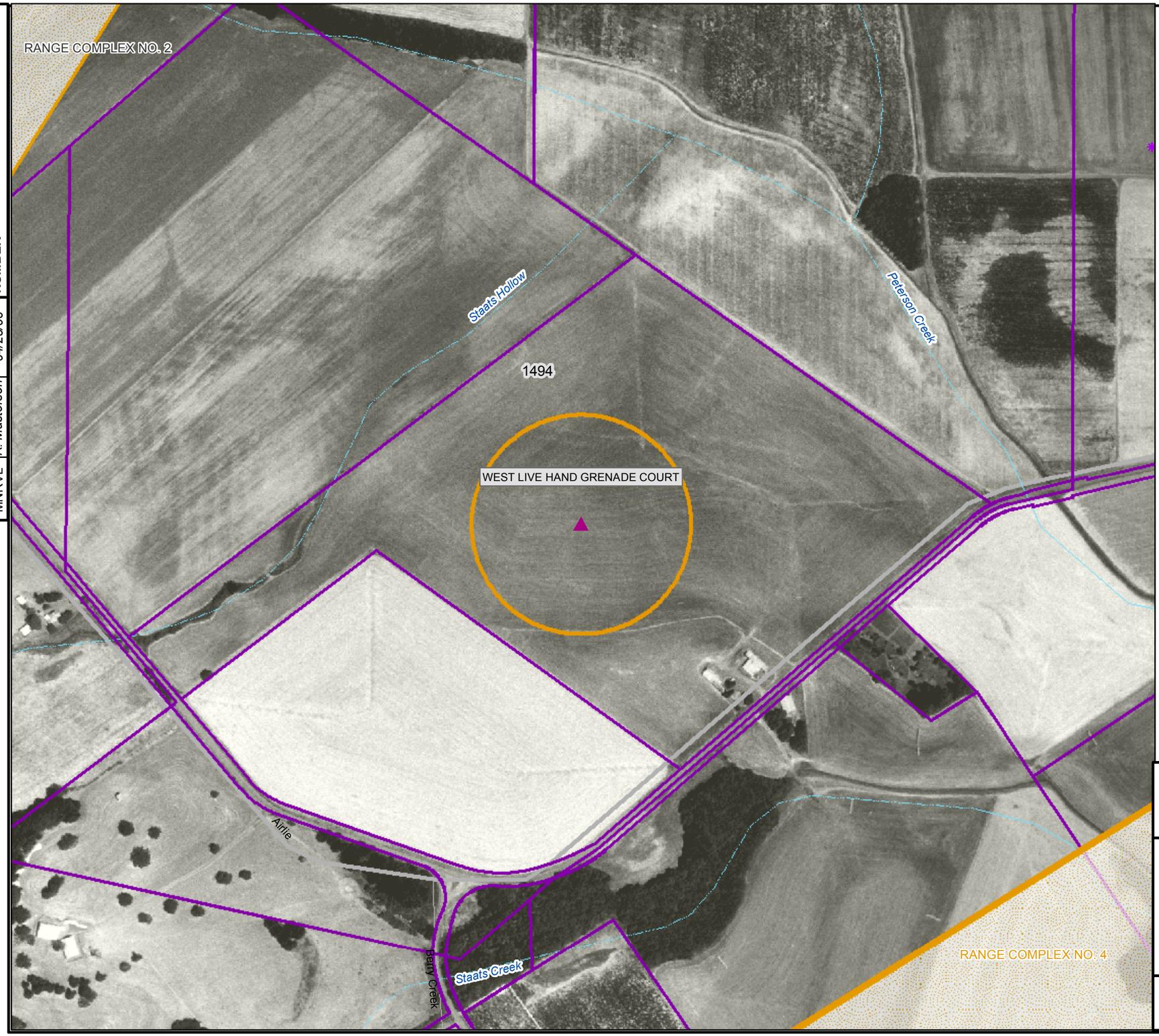
FIGURE 12

EAST LIVE HAND GRENADE COURT

CAMP ADAIR

Shaw Shaw Environmental, Inc.

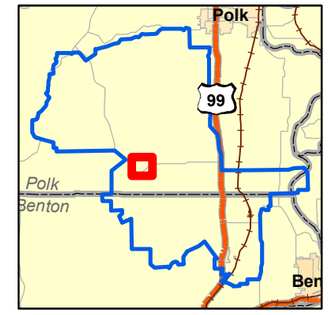
OFFICE	DRAWN BY		DRAWING NUMBER
MNRVL	K. Masterson	04/25/06	CampAdair_013_fig13_WLHG



Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Taxlot Parcel
- Public Land (2003)
- Reported MEC Find
- Well (Source: USGS)
- Proposed Soil Sample Location

NOTES:
1) AOC Boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.
4) Aerial photo from TerraServer, dated July 30, 2000.



0 500 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

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FIGURE 13

WEST LIVE HAND GRENADE COURT

CAMP ADAIR

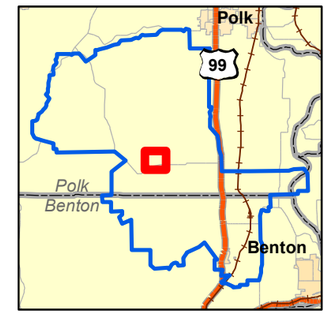
Shaw® Shaw Environmental, Inc.

OFFICE	DRAWN BY		DRAWING NUMBER
mnrvl	K. Masterson	04/25/06	CampAdair_014_fig14_HG129

Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Taxlot Parcel
- Public Land (2003)
- Reported MEC Find
- Well (Source: USGS)
- Proposed Soil Sample Location

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.
4) Aerial photo from TerraServer, dated July 30, 2000.



0 500 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

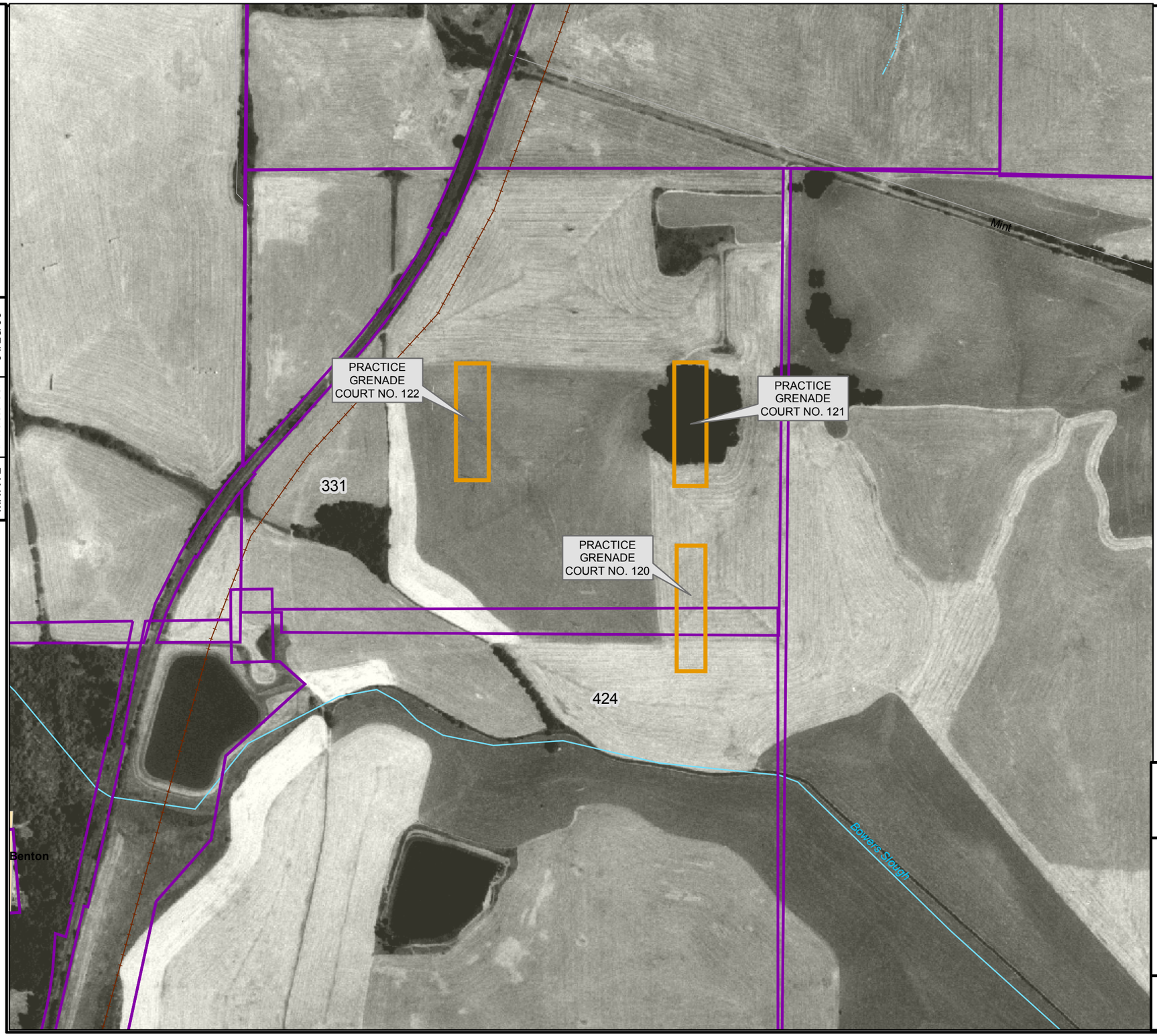
FIGURE 14

LIVE HAND GRENADE COURT NO. 129

CAMP ADAIR

Shaw Environmental, Inc.

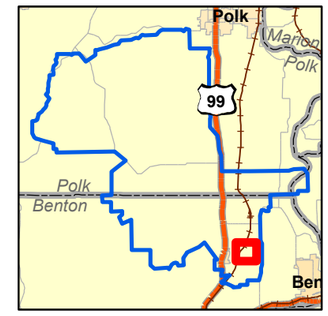
OFFICE	DRAWN BY	DRAWING NUMBER
MNRVL	K. Masterson 04/25/06	CampAdair_015_fig15_pg120_122



Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Taxlot Parcel
- Public Land (2003)
- Reported MEC Find
- Well (Source: USGS)

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.
4) Aerial photo from TerraServer, dated July 30, 2000.



N

0 500 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

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FIGURE 15
PRACTICE GRENADE COURTS
NOs. 120, 121 AND 122

CAMP ADAIR

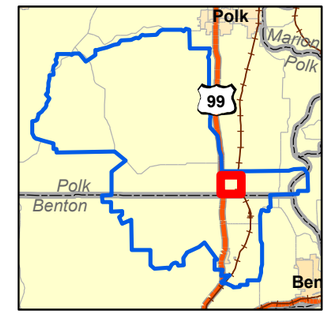
Shaw Environmental, Inc.

DRAWING NUMBER	CampAdair_016_fig16_pg125_127
DRAWN BY	K. Masterson 04/25/06
OFFICE	MNRVL

Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Taxlot Parcel
- Public Land (2003)
- Reported MEC Find
- Well (Source: USGS)

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.
4) Aerial photo from TerraServer, dated July 30, 2000.



N

0 500 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

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OMAHA DESIGN CENTER

FIGURE 16
PRACTICE GRENADE COURTS
NOs. 125, 126 AND 127

CAMP ADAIR

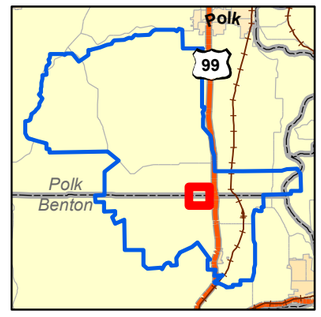
Shaw Shaw Environmental, Inc.

OFFICE: MNRVL
DRAWN BY: K.Masterson 3/15/06
DRAWING NUMBER: CampAdair_017_fig17_CI182

Legend

- Camp Adair Installation Area
- Camp Adair AOCs
- Taxlot Parcel
- Public Land (2003)
- Reported MEC Find
- Well (Source: USGS)

NOTES:
1) AOC boundaries were derived from the Camp Adair ASR Supplement.
2) Groundwater well data were obtained from USGS.
3) These ranges are located within the Willamette Watershed.
4) Aerial photo from TerraServer, dated July 30, 2000.



N

0 500 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

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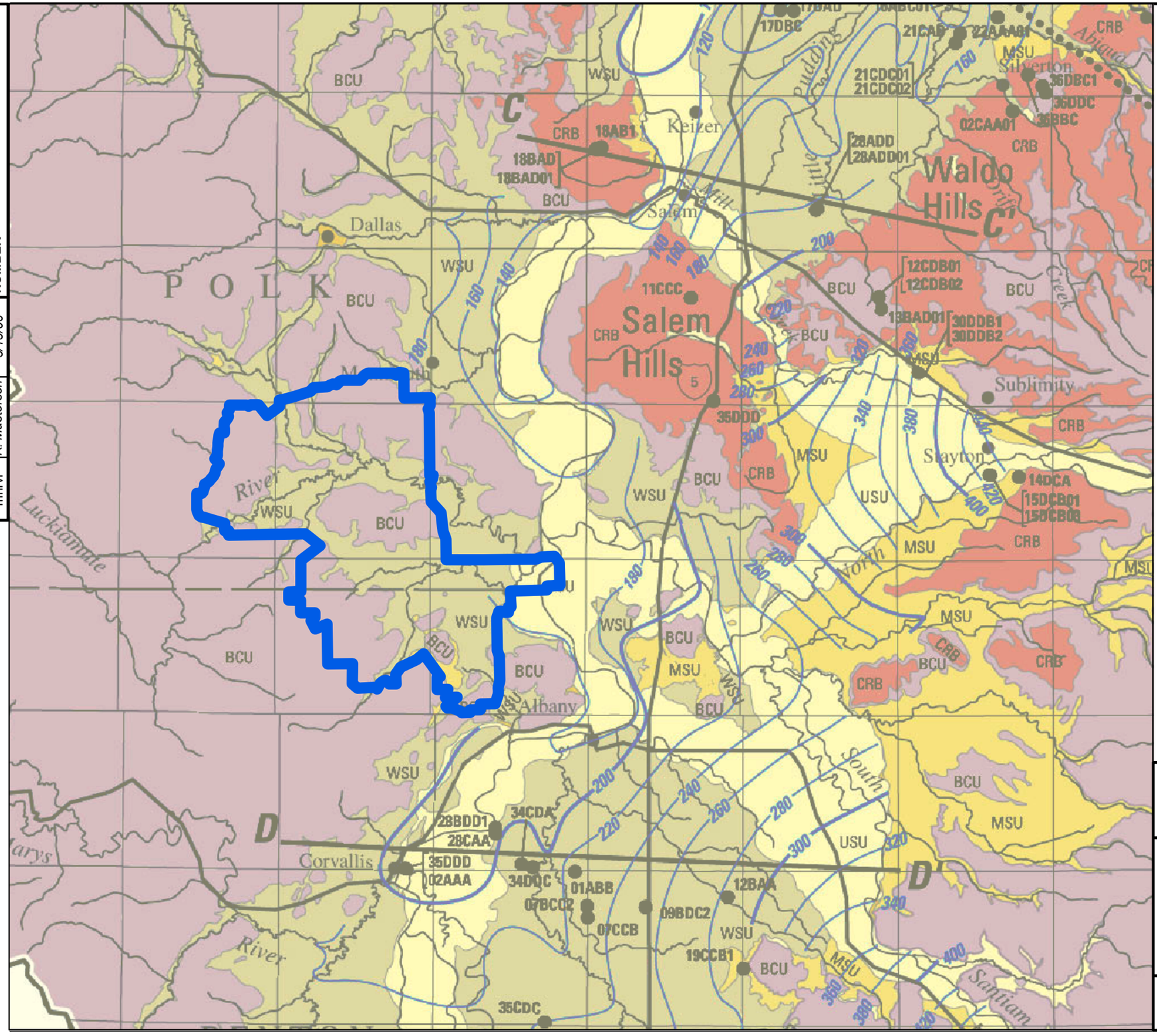
FIGURE 17

CHEMICAL IDENT. AREA NO. 182

CAMP ADAIR

Shaw® Shaw Environmental, Inc.

OFFICE: mnrvl
DRAWN BY: K. Masterson 3/13/06
DRAWING NUMBER: CampAdair_018_fig0A_willamette



Legend

Camp Adair Installation Area

EXPLANATION

Hydrogeologic unit

HCU	High Cascade unit
USU	Upper sedimentary unit
WSU	Willamette silt unit
MSU	Middle sedimentary unit
LSU	Lower sedimentary unit
CRB	Columbia River basalt unit
BCU	Basement confining unit

NOTES:
1) Map Source:
Conlon et al., Ground-water Hydrology of the Willamette Basin, Oregon, U.S. Geological Survey, Scientific Investigations Report 2005 - 5168, Plate 1: Hydrogeologic map with selected wells and cross sections

0 1.5 3 6
Miles

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

N

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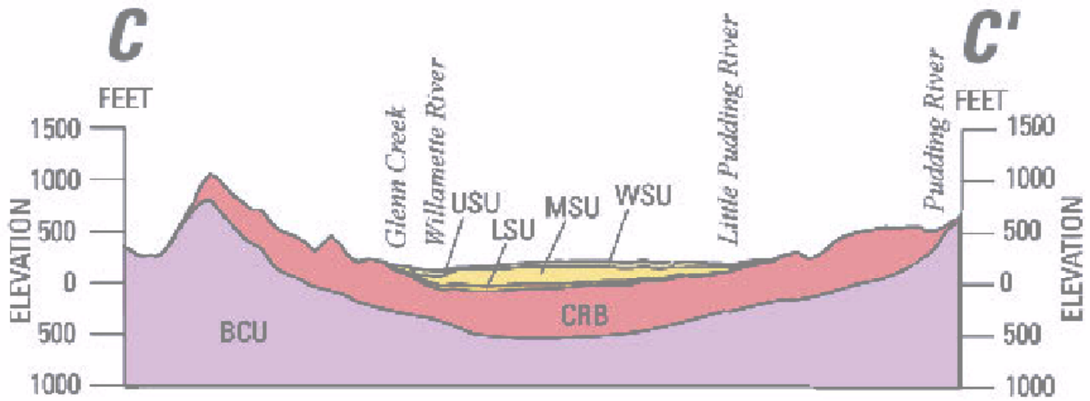
FIGURE 18

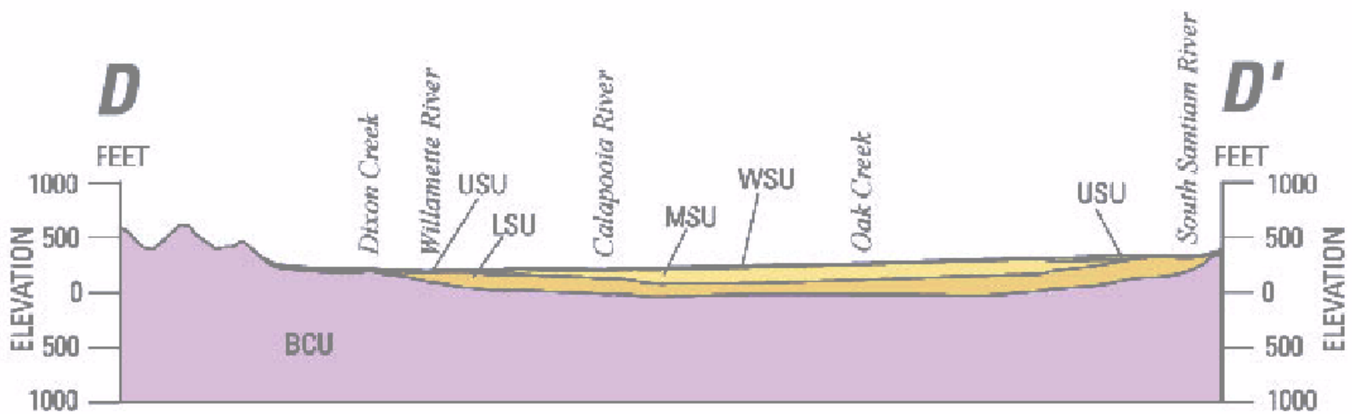
HYDROGEOLOGIC MAP OF CAMP ADAIR AREA

CAMP ADAIR

Shaw Shaw Environmental, Inc.

OFFICE	DRAWN BY		DRAWING NUMBER
mnrvl	K. Masterson	2/28/06	CampAdair_019_fig0b_xsection





EXPLANATION

Hydrogeologic unit

HCU	High Cascade unit
USU	Upper sedimentary unit
WSU	Willamette silt unit
MSU	Middle sedimentary unit
LSU	Lower sedimentary unit
CRB	Columbia River basalt unit
BCU	Basement confining unit

NOTES:

) Map Source:
Conlon et al., Ground-water Hydrology of the Willamette Basin, Oregon, U.S. Geological Survey, Scientific Investigations Report 2005 - 5168, Plate 1: Hydrogeologic map with selected wells and cross sections

0 1.5 3 6
Miles

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

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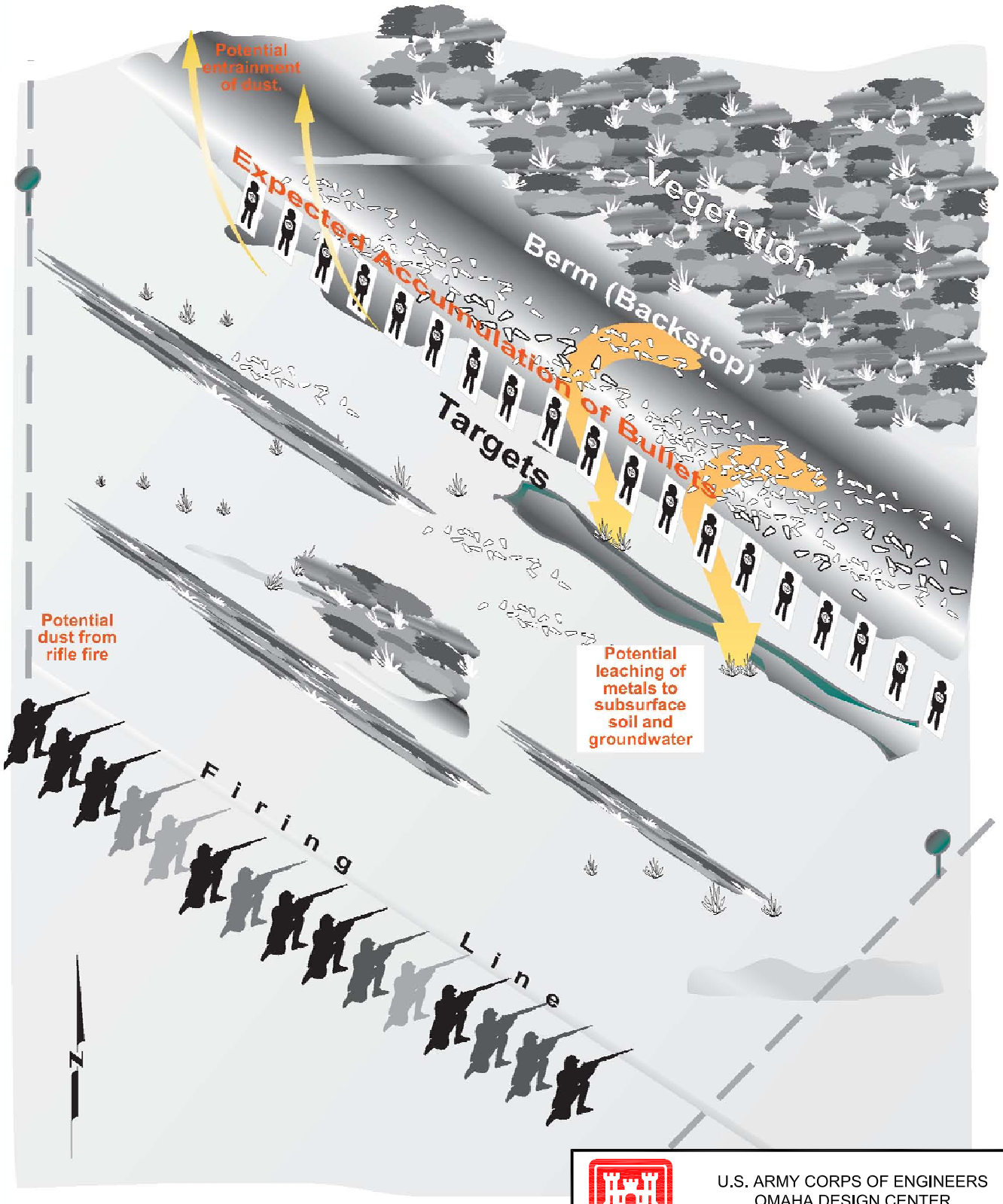
FIGURE 19

HYDROGEOLOGIC CROSS SECTIONS
NEAR CAMP ADAIR

CAMP ADAIR

Shaw® Shaw Environmental, Inc.

OFFICE	DRAWN BY		DRAWING NUMBER
SJ	K. Black	05/05/06	116188SJ-A28



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OMAHA DESIGN CENTER

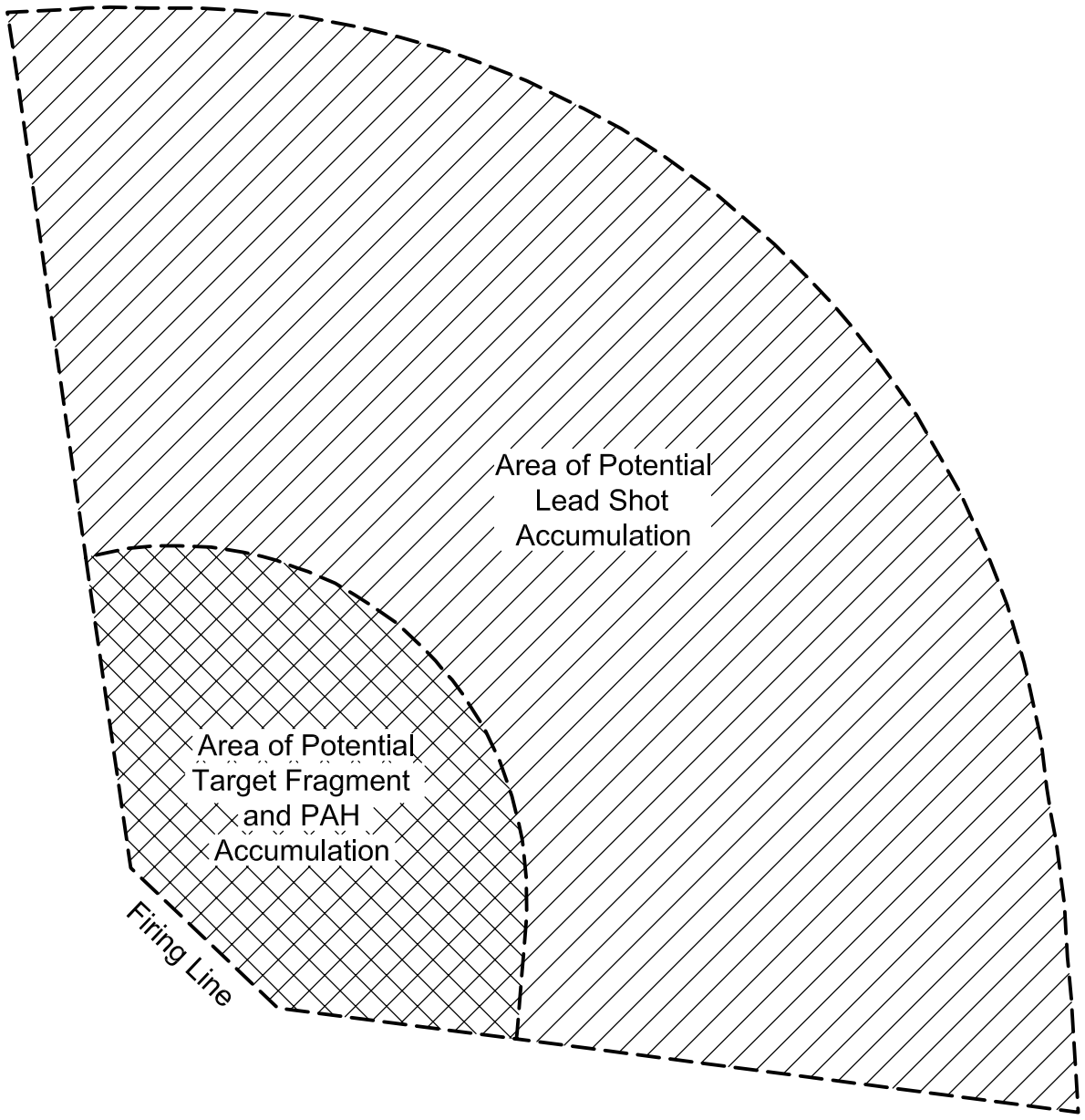
FIGURE 20

CONCEPTUAL SITE MODEL
RANGE WITH BERM

CAMP ADAIR

Shaw® Shaw Environmental, Inc.

OFFICE	DRAWN BY		DRAWING NUMBER
SJ	K. Black	05/05/06	116188SJ-A29



PLAN VIEW

SCALE

0 150 300 FEET

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OMAHA DESIGN CENTER

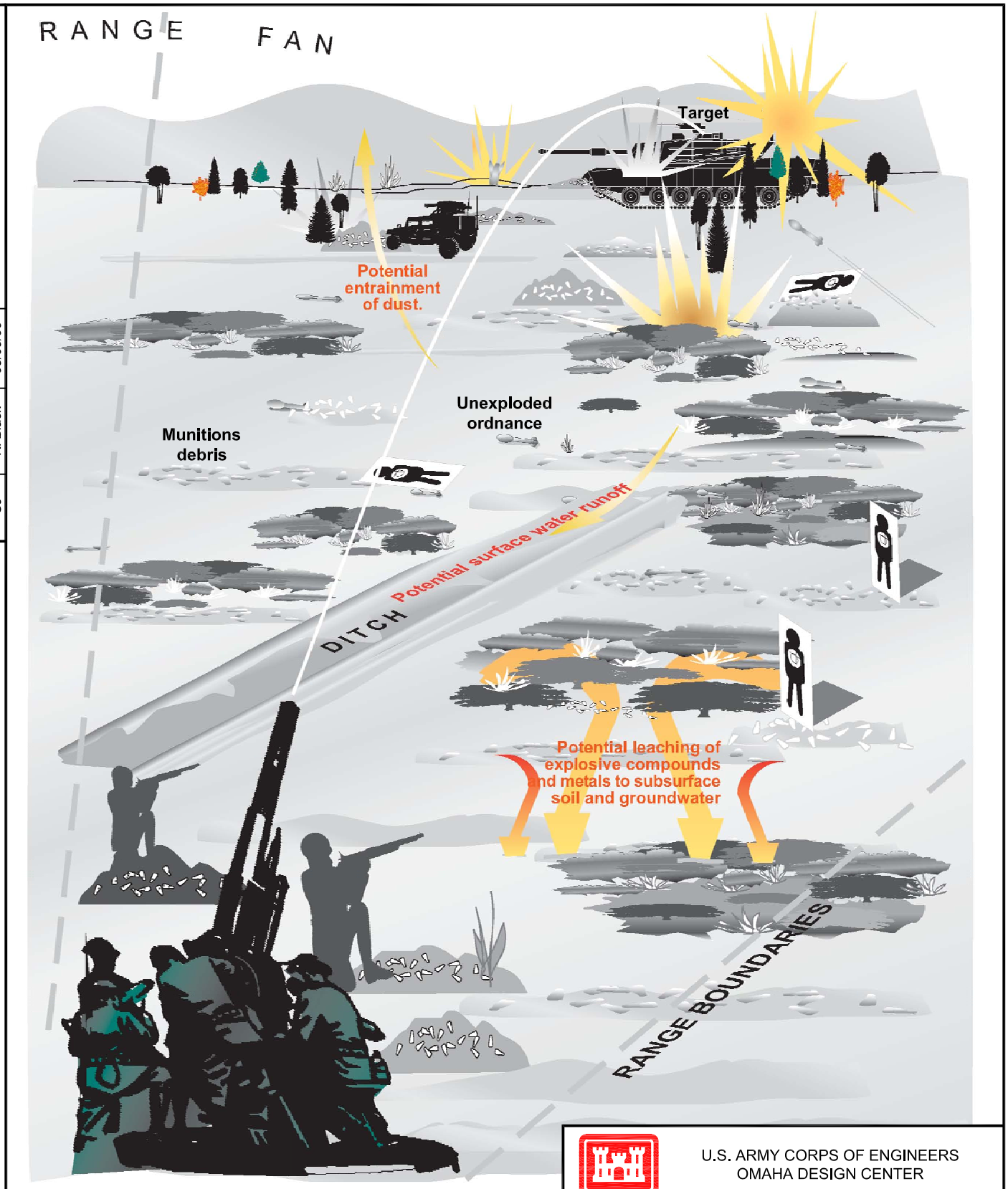
FIGURE 21

CONCEPTUAL SITE MODEL
SKEET RANGE

CAMP ADAIR

Shaw® Shaw Environmental, Inc.

OFFICE	DRAWN BY		DRAWING NUMBER
SJ	K. Black	05/05/06	116188SJ-A30



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OMAHA DESIGN CENTER

FIGURE 22

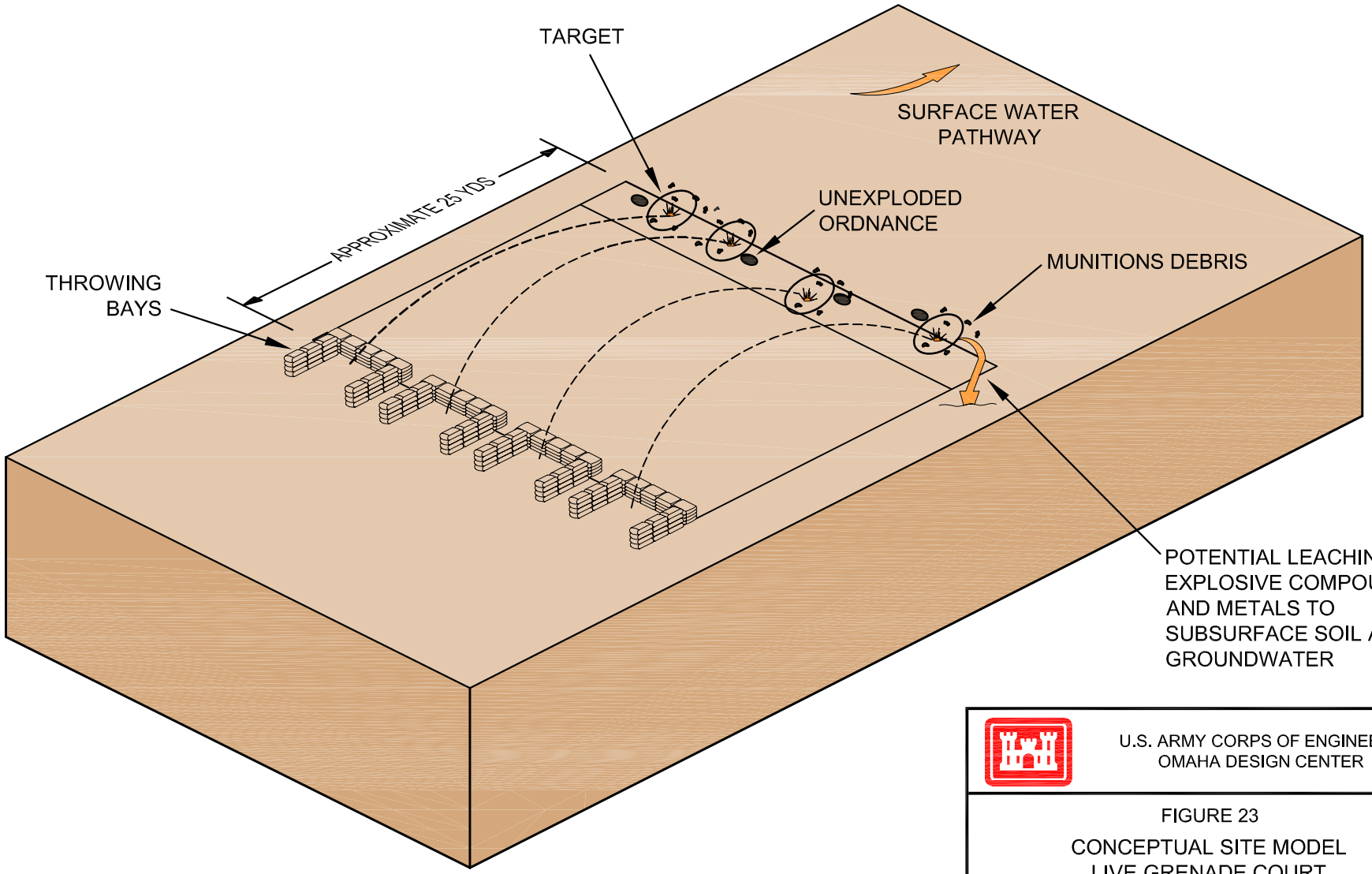
CONCEPTUAL SITE MODEL
MULTI-USE RANGE

CAMP ADAIR

Shaw® Shaw Environmental, Inc.

XREF Files: IMAGE Files:
File: N:\cad\DWG\116188-FUDS\116188SJ-a46.dwg Layout: Layout User: Karen.Black May 05, 2006 - 10:18am

OFFICE	DRAWN BY		DRAWING NUMBER	116188SJ-A46
SJ	K. Black	05/05/06		



U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

FIGURE 23

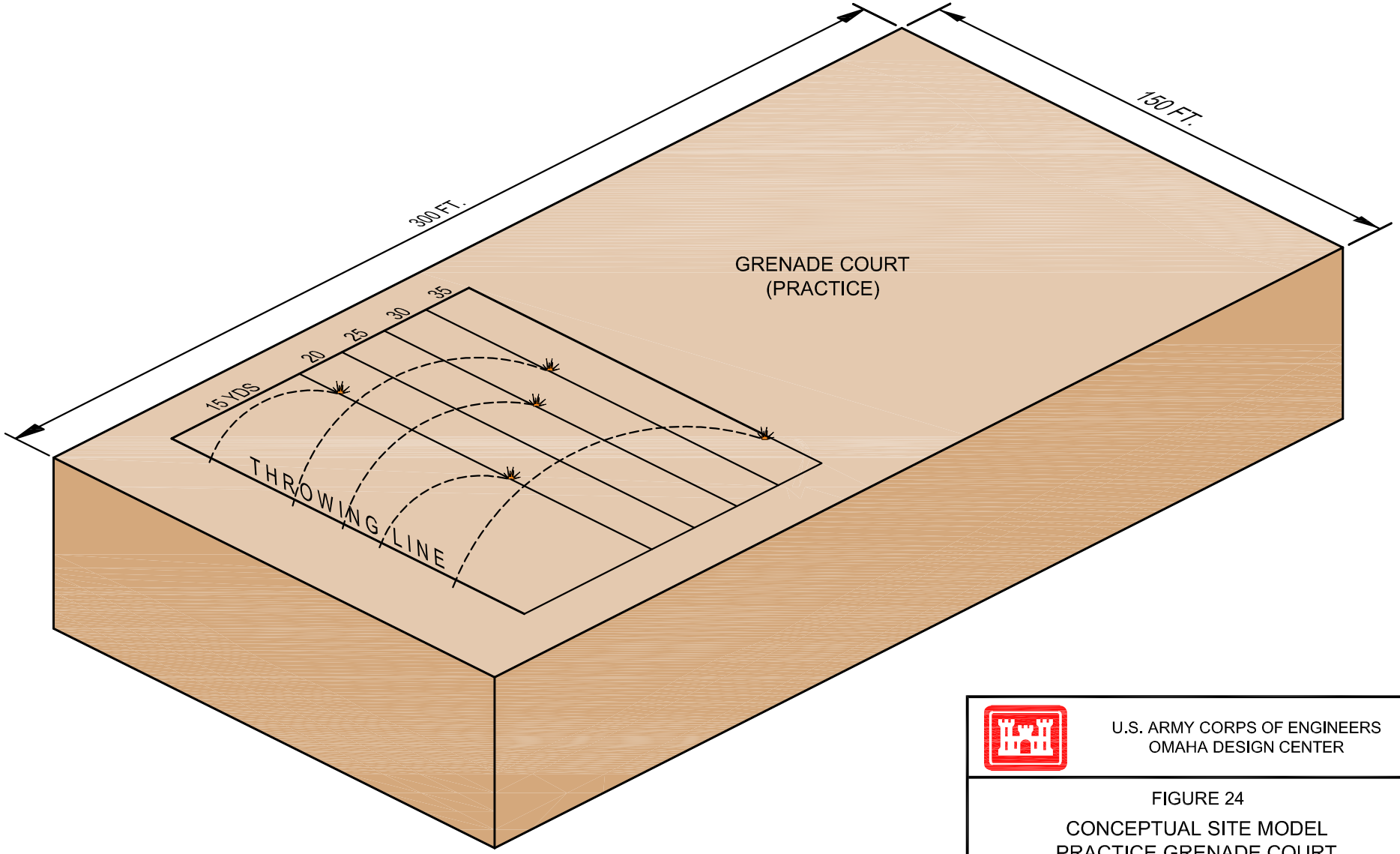
CONCEPTUAL SITE MODEL
LIVE GRENADE COURT

CAMP ADAIR

Shaw® Shaw Environmental, Inc.

XREF Files: IMAGE Files:
File: N:\cad\DWG\116188-FUDS\116188SJ-a31.dwg Layout: Layout User: Karen.Black May 05, 2006 - 9:56am

OFFICE	DRAWN BY		DRAWING NUMBER	116188SJ-A31
SJ	K. Black	1-12-06		



U.S. ARMY CORPS OF ENGINEERS
OMAHA DESIGN CENTER

FIGURE 24

CONCEPTUAL SITE MODEL
PRACTICE GRENADE COURT

CAMP ADAIR

Shaw® Shaw Environmental, Inc.

Tables

Table 1
MEC, MC, Perchlorate, and Land Use Controls at Camp Adair Areas of Concern

AOC	Munitions	Munitions Constituents	Land Use Controls [2]
Skeet Range No. 580	Small Arms General	Lead, single(nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant; PAH (from targets)	No
Practice Grenade Court No. 122	M21 Practice Hand Grenade	Black Powder (Potassium nitrate, sulfur, charcoal)	No
	Mk 1A1 Practice Hand Grenade	Inert	
Practice Grenade Court No. 120	M21 Practice Hand Grenade	Black Powder (Potassium nitrate, sulfur, charcoal)	No
	Mk 1A1 Practice Hand Grenade	inert	
Practice Grenade Court No. 121	M21 Practice Hand Grenade	Black Powder (Potassium nitrate, sulfur, charcoal)	No
	Mk 1A1 Training Hand Grenade	Inert	
Infiltration Range No. 143	Small Arms General	Lead, single(nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant	No
	Explosives Dynamite Commercial	Nitroglycerin (NG)	
	Blasting Caps Electrical and Nonelectrical M6 & M7	Sensitive Explosive	
Chemical Identification Area No. 182	Pot Tear Gas M1	Chloracetophenone mixture	No
	Capsule Riot Control CS		
	Chemical ID Set, Instructional M1	Mustard, Chlorpicrin, Lewisite, Adamsite, Chloracetophenone, Triphosgene	
	Chemical ID Set, Detonation M1	Mustard, Lewisite, Chlorpicrin, and Phosgene	
	Chemical ID, Toxic Gas Set M1	24 bottles of 32 ounces of Mustard or Distilled Mustard	
	Toxic Chemical Munitions	No data sheets provided	
Practice Grenade Court No. 127	M21 Practice Hand Grenade	Black Powder (Potassium nitrate, sulfur, charcoal)	No
	Mk 1A1 Training Hand Grenade	Inert	
Practice Grenade Court No. 125	M21 Practice Hand Grenade	Black Powder (Potassium nitrate, sulfur, charcoal)	No
	Mk 1A1 Practice Hand Grenade	Inert	
Practice Grenade Court No. 126	M21 Practice Hand Grenade	Black Powder (Potassium nitrate, sulfur, charcoal)	No
	Mk 1A1 Training Hand Grenade	Inert	
East Live Hand Grenade Court	Mk II Hand Grenade Frag	TNT, Flaked or granular, older models used E.C. Blankfire Smokeless Powder, M204 (fuze)	No
	M21 Practice Hand Grenade	Black Powder (Potassium nitrate, sulfur, charcoal)	

Table 1 (Cont.)
MEC, MC, Perchlorate, and Land Use Controls at Camp Adair Areas of Concern

AOC	Munitions	Munitions Constituents	Land Use Controls [2]
Live Hand Grenade Court No. 129	Mk II Hand Grenade Frag	TNT, Flaked or granular, older models used E.C. Blankfire Smokeless Powder	No
	M21 Practice Hand Grenade	Black Powder (Potassium nitrate, sulfur, charcoal)	
West Live hand Grenade Court	Mk II Hand Grenade Frag	TNT, Flaked or granular, older models used E.C. Blankfire Smokeless Powder, M204 (Fuze)	No
	M21 Practice Hand Grenade	Black Powder (Potassium nitrate, sulfur, charcoal)	
Bombing Target No. 1	AN-M30 General Purpose Bomb, 100-lb	TNT	No
	100-lb Bomb, GP, Mk 1	TNT	
	500-lb Bomb, GP, Mk 12	TNT, amatol (TNT and ammonium nitrate), and tritonal (TNT and aluminum powder)	
	AN-Mk 5, AN-Mk 23, AN-Mk43, Practice Bombs	Black Powder (Potassium nitrate, sulfur, charcoal), red phosphorus	
	M38A2, Practice Bomb, 100-lb	3-lb spotting charge (Black Powder) single (nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant	
	105-mm, Fixed HE M38	Black Powder (Potassium nitrate, sulfur, charcoal)	
	155-mm HE MkI	TNT	
Mortar Range	Small Arms General	Lead, single (nitrocellulose)- or double-base (nitrocellulose and nitroglycerin)	No
	60-mm HE M49	TNT, Ballistite (nitrocellulose and nitroglycerin)	
Moving Target Range No. 75	75-mm Gun HE M48	TNT, & FNH (nitrocellulose) powder	No
	37-mm AP M74	FNH (nitrocellulose) powder	
Range Complex No. 1	50 Cal. Machine Gun	Lead, single(nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant, perchlorate	No
	Small Arms General	Lead, single(nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant	
	Mk II Hand Grenade Frag	TNT, Flaked or granular, older models used E.C. Blankfire Smokeless Powder , (Nitrocellulose, Potassium Nitrate, Barium Nitrate, Starch, Diphenylalamine M204 (fuze)	
	M21 Practice Hand Grenade	Black Powder (Potassium nitrate, sulfur, charcoal)	
	100-lb Bomb, GP Mk 1	TNT	
	500-lb Bomb, GP, Mk 12	TNT, amatol (TNT and ammonium nitrate), and tritonal (TNT and aluminum powder)	
	AN-M30 General Purpose Bomb, 100-lb	TNT	

Table 1 (Cont.)
MEC, MC, Perchlorate, and Land Use Controls at Camp Adair Areas of Concern

AOC	Munitions	Munitions Constituents	Land Use Controls [2]
	AN-Mk5, AN-Mk 23, AN-Mk43, Practice Bombs	Black Powder (Potassium nitrate, sulfur, charcoal), red phosphorus	
	M38A2, Practice bomb, 100 lb	3 lb spotting charge (Black Powder) single (nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant	
	Signal, Practice Bomb Mk 4	Nitrocellulose, red phosphorus	
	Spotting Charge, M1A1	Black Powder, (potassium nitrate, sulfur, and charcoal)	
	M6A1 Rocket HEAT 2.36-in	Pentolite (Pentaerythrite tetranitrate [PETN) and TNT), Ballistite (nitrocellulose and nitroglycerin), M400 (fuze), perchlorate	
	M6A3 Rocket HEAT 2.36-in	Pentolite (PETN and TNT), Ballistite (nitroglycerin and nitrocellulose), M400 (fuze), perchlorate	
	M7A1 Practice Rocket 2.36-in	5 sticks of Ballistite (nitrocellulose and nitroglycerin), perchlorate	
	M7A3 Practice Rocket 2.36-in	5 sticks of Ballistite (nitrocellulose and nitroglycerin), perchlorate	
	105-mm HE M1	Black Powder (potassium nitrate, sulfer, charcoal)	
	155-mm HE M107	TNT and Composition B (TNT and RDX)	
	3-7mm HE M54	FNH powder (nitrocellulose)	
	57-mm APC-T M86	FNH powder (nitrocellulose)	
	Large Caliber (37-m and larger) (Incendiary Smoke)	FNH powder (nitrocellulose) (propelling charge)	
	60-mm HE M49	TNT, Ballistite (nitrocellulose and nitroglycerin)	
	81-mm HE M43	TNT, Ballistite (nitrocellulose and nitroglycerin)	
	Mortars (incendiary, illumination, smoke)	White phosphorus, thermite	
	Explosives TNT	TNT	
	Blasting Caps Electrical and Nonelectrical M6 & M7	Sensitive Explosive	
Range Complex No. 2	.50 Cal. Machine Gun	Lead, single(nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant, perchlorate	No
	Small Arms General	Lead, single(nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant;	
	105-mm HE M1	TNT and Composition B (TNT and RDX)	
	105-mm HEAT-T M622	Composition B (TNT and RTX)	
	155-mm HE M107	TNT and Composition B (TNT and RDX)	
	37-mm HE M54	FNH powder (nitrocellulose)	
	57-mm APC-T M86	FNH powder (nitrocellulose)	
	60mm HE M49	TNT, Ballistite (nitrocellulose and nitroglycerin)	
	81-mm HE M43	TNT, Ballistite (nitrocellulose and	

Table 1 (Cont.)
MEC, MC, Perchlorate, and Land Use Controls at Camp Adair Areas of Concern

AOC	Munitions	Munitions Constituents	Land Use Controls [2]
		nitroglycerin)	
	60-mm Illuminating M721	White phosphorus	
	60-mm Practice M50A2	Inert with Black Powder (potassium nitrate, sulfur, charcoal)	
	81-mm TP M43A1	Inert with Black Powder (potassium nitrate, sulfer, charcoal)	
	Explosives-Commercial Dynamite	Nitroglycerin	
	Blasting Caps Electrical and Nonelectrical M6 & M7	Sensitive Explosive	
Range Complex No. 3	.50 Cal. Machine Gun	Lead, single(nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant, perchlorate	No
	Small Arms General	Lead, single(nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant;	
	105-mm HE M1	TNT and Composition B (TNT and RDX)	
	155-mm HE M107	TNT and Composition B (TNT and RDX)	
	37-mm HE M54	FNH powder (nitrocellulose)	
	57-mm APC-T M86	FNH powder (nitrocellulose)	
	60-mm HE M49	TNT, Ballistite (nitrocellulose and nitroglycerin)	
	81-mm HE M43	TNT, Ballistite (nitrocellulose and nitroglycerin)	
	60-mm Practice M50A2	Inert with Black Powder (potassium nitrate, sulfur, charcoal)	
	81-mm TP M43A1	Inert with Black Powder (potassium nitrate, sulfur, charcoal)	
Range Complex No. 4	.50 Cal. Machine Gun	Lead, single(nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant, perchlorate	No
	Small Arms General	Lead, single(nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant;	
Range Complex No. 5	.50 Cal. Machine Gun	Lead, single(nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant, perchlorate	No
	Small Arms General	Lead, single(nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant;	
Range Complex No. 6	Small Arms General	Lead, single(nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant;	No

[1] From USACE table - Omaha Perchlorate Rationales for FY05 and FY05 add-on sites
[2] From ASR Supplement

Table 2
MEC and MC Exposure Pathway Analysis – Small Arms Ranges

Range Area & Type	MMRP Concern	Potential Contaminant of Concern (PCOCs)	Affected Media (Potential Contaminant Sources) (Fate and Transport)	Exposure Routes and Potential Receptors			Data Gaps	Activities to Address Data Gaps (i.e., Sampling)
				Site Workers/ Contractor Personnel	Residents/ General Public	Ecological		
Small Arms Ranges	**MEC**	MEC in the form of unused or discarded small arms rounds or other unknown munitions. No MEC risk is associated with skeet range.	**Surface & Subsurface Soils** • Low hazard associated with small arms rounds (stable, non-explosive projectiles). Potential for unknown explosive MEC sources.	• Potentially complete pathway. • Exposure routes: - Vehicle traffic - Foot traffic - Intrusive activities - Geologic instability	• Potentially complete pathway. • Exposure routes: - Vehicle traffic - Foot traffic - Intrusive activities - Geologic instability	• Potentially complete pathway. • Exposure routes: - Foot traffic - Burrowing - Geologic instability	• Presence of MEC is unknown, except at skeet range where MEC is considered to be absent based on history of use.	Visual reconnaissance and localized magnetometer sweeps will be conducted to: • Assess presence of MEC, • Practice MEC avoidance, and • Select appropriate sample locations.
	MC	Lead Antimony and copper (in lower concentrations than lead; therefore inspection will focus on lead) Infiltration ranges--also TNT (static charges) and negligible quantity of mercury (in blasting caps) Perchlorate (.50 caliber machine gun tracers) PAH (skeet range targets)	**Soil** • Affected by lead projectiles on or within the ground.	• Potentially complete pathway. • Exposure routes (during intrusive work): - incidental ingestion, - dermal contact, and - inhalation of soil particulates.	• Potentially complete pathway. • Exposure routes (during intrusive work): - incidental ingestion, - dermal contact, and - inhalation of soil particulates.	• Potentially complete pathway. • Exposure routes: - ingestion, and - direct contact by area fauna.	• Analytical data do not exist.	• Composite soil samples will be analyzed for lead. Soil samples for lead will be sieved (#10 sieve) by the laboratory prior to analysis. • Infiltration Range 143 is not accessible due to heavy excavation and placement of 200 ft of municipal waste. • Infiltration Range No. 141 of Range Complex No. 4 is within the current National Guard exercise area and will not be inspected or sampled. • Soils within the Skeet Range No. 580 will be analyzed for lead and polycyclic aromatic hydrocarbons.
			Surface Water /Sediment • Potentially affected (streams and ponds). • Fate & Transport: via surface runoff from impacted soil.	• Potentially complete pathway. • Exposure routes: - incidental ingestion, - dermal contact, and - inhalation.	• Potentially complete pathway • Exposure - incidental ingestion, - dermal contact, and - inhalation.	• Potentially complete pathway. • Exposure routes: - ingestion, and - direct contact by area fauna.	• Analytical data do not exist.	• Impact to surface water will be addressed via primarily affected medium--sediment. Locations of potential soil sources are known from historical maps. Will address surface water pathway with sediment data; impact to surface water will conservatively be assumed if sediment contamination is identified. • Surface water potentially impacted from the largest small arms range complex will be addressed by sampling sediment from surface water pathway for lead.
			Groundwater • Potentially affected media. • Fate & Transport: via groundwater migration.	• Potentially complete pathway. • Exposure routes (during intrusive work): - incidental ingestion, and - dermal contact.	• Potentially complete pathway - evidence of domestic wells within 2 miles. • Exposure routes: - ingestion, and - dermal contact.	• Incomplete pathway, no ecological access to groundwater.	• Analytical data do not exist.	• Impact to groundwater will be addressed via primarily affected medium--soil. • A groundwater sample will be collected at each of three small arms range complexes and analyzed for dissolved lead (+/- perchlorate).
			Air • Not affected (non-volatile PCOCs)	Incomplete Pathway	Incomplete Pathway	Incomplete Pathway	None	None

Table 2 (continued)
MEC and MC Exposure Pathway Analysis – Explosive Munitions Ranges

Range Area & Type	MMRP Concern	Potential Contaminant of Concern (PCOCs)	Affected Media (Potential Contaminant Sources) (Fate and Transport)	Exposure Routes and Potential Receptors			Data Gaps	Activities to Address Data Gaps (i.e., Sampling)
				Site Workers/ Contractor Personnel	Residents/ General Public	Ecological (Livestock & Biota)		
Explosive Munitions Ranges	**MEC**	MEC in the form of ***unexploded*** military munitions used at this site.	**Surface & Subsurface Soils** • Unexploded munitions are a hazard.	• Complete pathway (MEC found). • Exposure routes: - Vehicle traffic - Foot traffic - Intrusive activities - Geologic instability	• Complete pathway (MEC found). • Exposure routes: - Vehicle traffic - Foot traffic - Intrusive activity - Geologic instability	• Complete pathway (MEC found). • Exposure routes: - Foot traffic - Burrowing - Geologic instability	• None—Presence of MEC is known from previous MEC encounters.	Visual reconnaissance and localized magnetometer sweeps will be conducted to: • Practice MEC avoidance, and • Select appropriate sample locations.
	MC	Explosives Metals Perchlorate	**Soil** • Incomplete detonation of explosive munitions.	• Potentially complete pathway. • Exposure routes (during intrusive work): - incidental ingestion, - dermal contact, and - inhalation of soil particulates.	• Potentially complete pathway. • Exposure routes (during intrusive work): - incidental ingestion, - dermal contact, and - inhalation of soil particulates.	• Potentially complete pathway but contact for most animals limited due to grass cover. • Exposure routes: - ingestion, and - direct contact by area fauna.	• Analytical data do not exist.	• Composite soil samples will be analyzed for explosives and select metals (see Table 3). Soil samples for metals will be sieved (#10 sieve) by the laboratory prior to analysis.
			Surface Water /Sediment • Potentially affected (streams and ponds). • Fate & Transport: via surface runoff from impacted soil.	• Potentially complete pathway. • Exposure routes: - incidental ingestion, - dermal contact, and - inhalation.	• Potentially complete pathway. • Exposure routes: - incidental ingestion, - dermal contact, and - inhalation.	• Potentially complete pathway • Exposure routes: - ingestion, and - direct contact by area fauna.	• Analytical data do not exist.	• Surface water potentially impacted from the explosive munitions ranges will be addressed by sampling sediment from surface water pathways for explosives and select metals (see Table 3).
			Groundwater • Potentially affected media. • Fate & Transport: via groundwater migration.	• Potentially complete pathway. • Exposure routes (during intrusive work): - incidental ingestion and - dermal contact.	• Potentially complete—evidence of domestic wells within 2 miles. • Exposure routes: - incidental ingestion and - dermal contact.	• Incomplete pathway for biota, no ecological access to groundwater. • Potentially complete pathway for livestock: - ingestion and - dermal contact.	• Analytical data do not exist.	• Groundwater samples will be collected at each AOC and analyzed for explosives, dissolved select metals (see Table 3), and perchlorate.
			Air • Not affected (non-volatile PCOCs)	Incomplete Pathway	Incomplete Pathway	Incomplete Pathway	None	None

Table 2 (continued)
MEC and MC Exposure Pathway Analysis – Live Hand Grenade Courts

Range Area & Type	MMRP Concern	Potential Contaminant of Concern (PCOCs)	Affected Media (Potential Contaminant Sources) (Fate and Transport)	Exposure Routes and Potential Receptors			Data Gaps	Activities to Address Data Gaps (i.e., Sampling)
				Site Workers/ Contractor Personnel	Residents/ General Public	Ecological (Livestock & Biota)		
Live Hand Grenade Court	**MEC**	MEC in the form of ***unexploded*** grenades used at this site.	**Surface & Subsurface Soils** • Unexploded grenades are a hazard.	• Complete pathway (MEC found). • Exposure routes: - Vehicle traffic - Foot traffic - Intrusive activity - Geologic instability	• Potentially complete pathway. • Exposure routes: - Vehicle traffic - Foot traffic - Intrusive activities - Geologic instability	• Potentially complete pathway. • Exposure routes: - Foot traffic - Burrowing - Geologic instability	• None	Visual reconnaissance and localized magnetometer sweeps will be conducted to: • Practice MEC avoidance, and • Select appropriate sample locations.
	MC Explosives Metals		**Soil** • Incomplete detonation of explosive munitions	• Potentially complete pathway. • Exposure routes (during intrusive work): - incidental ingestion, - dermal contact, and - inhalation of soil particulates.	• Potentially complete pathway. • Exposure routes (during intrusive work): - incidental ingestion, - dermal contact, and - inhalation of soil particulates.	• Potentially complete pathway. • Exposure routes: - ingestion, and - direct contact by area fauna.	• Analytical data do not exist.	• One composite soil sample from each AOC will be analyzed for explosives and select metals (Table 3).
			Surface Water/Sediment • Potentially affected (streams/ditches). • Fate & Transport: via surface runoff from impacted soil.	• Potentially complete pathway. • Exposure routes: - incidental ingestion, - dermal contact, and - inhalation.	• Potentially complete pathway. • Exposure routes: - incidental ingestion, - dermal contact, and - inhalation.	• Potentially complete pathway. • Exposure routes: - ingestion, and - direct contact by area fauna.	• Analytical data do not exist.	• Impact to surface water will be addressed via primarily affected medium--soil. Locations of potential soil sources are known from historical maps. Will address surface water pathway with soil data; impact to surface water will conservatively be assumed if soil contamination is identified. • No sediment samples will be collected
			Groundwater • Potentially affected media. • Fate & Transport: via groundwater .	• Potentially complete pathway. • Exposure routes (during intrusive work): - incidental ingestion and - dermal contact.	• Potentially complete pathway - evidence of domestic wells within 2 miles. • Exposure routes: - ingestion and - dermal contact.	• Incomplete pathway, no ecological access to groundwater. • Potentially complete pathway for livestock: - ingestion and, - dermal contact.	• Analytical data do not exist.	• A ground water sample will be collected at one of the three live hand grenade court AOCs and analyzed for explosives, select metals (see Table 3), and perchlorate.
			Air • Not affected (non-volatile PCOCs)	Incomplete Pathway	Incomplete Pathway	Incomplete Pathway	None	None

Table 2 (continued)
MEC and MC Exposure Pathway Analysis – Practice Grenade Courts

Range Area & Type	MMRP Concern	Potential Contaminant of Concern (PCOCs)	Affected Media (Potential Contaminant Sources) (Fate and Transport)	Exposure Routes and Potential Receptors			Data Gaps	Activities to Address Data Gaps (i.e., Sampling)
				Site Workers/ Contractor Personnel	Residents/ General Public	Ecological		
Practice Grenade Courts	MEC	No indication of munitions being used at this AOC other than inert training grenades and practice grenades with small black powder charges.	**Surface & Subsurface Soils** • A mechanism by which explosive munitions would be present has not been identified.	• Incomplete pathway.	• Incomplete pathway.	• Incomplete pathway.	None	None
	MC	No PCOCs in black powder.	**Soil** • Not Applicable	Incomplete Pathway	Incomplete Pathway	Incomplete Pathway	None	None
			Surface Water/Sediment • Not Applicable	Incomplete Pathway	Incomplete Pathway	Incomplete Pathway	None	None
			Air • Not Applicable	Incomplete Pathway	Incomplete Pathway	Incomplete Pathway	None	None

Table 2 (continued)
MEC and MC Exposure Pathway Analysis – Chemical Identification Area No. 182

Range Area & Type	MMRP Concern	Potential Contaminant of Concern (PCOCs)	Affected Media (Potential Contaminant Sources) (Fate and Transport)	Exposure Routes and Potential Receptors			Data Gaps	Activities to Address Data Gaps (i.e., Sampling)
				Site Workers/ Contractor Personnel	Residents/ General Public	Ecological		
Chemical Identification Area No. 182	**MEC**	No indication of conventional munitions being used at this AOC. Small quantities of chemicals may have been used for training or demonstrations.	**Surface & Subsurface Soils** • A mechanism by which chemical or conventional munitions would be present has not been identified.	• Incomplete pathway.	• Incomplete pathway.	• Incomplete pathway.	None	None
	MC	Mustard, lewisite, and other chemicals may have been used for training purposes (identification kits) or for demonstrations of decontamination procedures.	**Soil** • Chemicals used in training would generally not persist in soil and/or would be of negligible quantity.	Incomplete Pathway	Incomplete Pathway	Incomplete Pathway	None	None
			Surface Water • Unaffected per impact to soil described above.	Incomplete Pathway	Incomplete Pathway	Incomplete Pathway	None	None
			Air • Unaffected per impact to soil described above.	Incomplete Pathway	Incomplete Pathway	Incomplete Pathway	None	None

Table 3
Proposed Sampling Approach

CSM	AOC	Number of Samples	Media to be Sampled			Contaminants of Concern								Survey for MEC	Comments
			Surface Soil	Sediment	Ground-water	Lead*		Selected Metals***		Explosives		Perchlorate	PAH		
						Soil/Sed	Water	Soil/Sed	Water**	Soil/Sed	Water	Water	Soil/Sed		
Small Arms Range	Infiltration Range No. 143	0												No	AOC is not accessible due to municipal waste landfill.
	Range Complex No. 4	10	8	1	1	9	1					1		Yes	
	Range Complex No. 5	5	4		1	4	1					1		Yes	
	Range Complex No. 6	5	4		1	4	1					See comment		Yes	No perchlorate containing small arms munitions used at AOC.
	Skeet Range No. 580	3	3			3							3	No	No MEC risk associated with skeet range based on history of range use.
Explosive Munitions Range	Range Complex No. 1	7	4	2	1			6	1	6	1	1		No	
	Range Complex No. 2	11	7	2	2			9	2	9	2	2		No	Analysis to include explosives due to the use of static explosive charges.
	Bombing Target No. 1	3	1	1	1			2	1	2	1	1		No	Perchlorate included because this AOC overlaps Range Complex No. 2.
	Range Complex No. 3	6	4	1	1			5	1	5	1	1		No	
	Mortar Range	4	2	1	1			3	1	3	1	1		No	
	Moving Target Range No. 75	4	2	1	1			3	1	3	1	1		No	
Live Hand Grenade Courts	East Live Grenade Court	2	1	1				2		2				No	
	West Live Hand Grenade Court	1	1					1		1				No	
	Live Hand Grenade Court No. 129	1	1	See comment			See comment	1		1				No	One groundwater sample will be collected from one the three live hand grenade court AOCs and analyzed for selected metals and explosives.
Practice Grenade Courts	Practice Grenade Courts (6)	0		See comment			See comment							No	No field investigation required.
Chemical Identification Area	Chemical Identification Area No. 182	0		See comment			See comment							No	No field investigation required.
17	Background Samples	16	10	3	3			13	3			3			
	Total Field Samples	**78******	**52**	**13**	**13**	**20**	**3**	**45**	**10**	**32**	**7**	**12**	**3**		

AOC--Areas of Concern

Surface soil samples are composite samples (7-point, wheel pattern with 2-foot radius). All other samples are discrete grab samples.

Lead and metals by SW846 6020. Explosives by SW846 8330A/Modified 8330A. Perchlorate by SW-846 6850. PAH by SW-846 8270C.

*Analyses for lead will be performed on soil or sediment that has been passed through an ASTM No. 10 (2-mm) wire mesh sieve at the laboratory.

** Water samples for lead or metals analysis will be shipped to the laboratory without preservative; laboratory will filter the sample for analysis of dissolved metals.
*** Selected metals are aluminum, antimony, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, magnesium, molybdenum, mercury, nickel, strontium, titanium, and zinc
**** One groundwater sample will be collected from one the three live hand grenade court AOCs and analyzed for selected metals and explosives.

Table 4
Human Health Screening Criteria for Soil/Sediment at Oregon Sites [a]

Analyte	Abbreviation	EPA Region 9 Human Health Screening Values			
		CAS No.	Residential PRG[b] (mg/kg)	SSLs[c] DAF=1 (mg/kg)	SSLs[c] DAF=20 (mg/kg)
Explosives					
Hexahydro-1,3,5-trinitro-1,3,5-triazine	RDX	121-82-4	4.4		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	HMX	2691-41-0	3,100		
2,4,6-Trinitrotoluene	2,4,6-TNT	118-96-7	16		
1,3,5-Trinitrobenzene	1,3,5-TNB	99-35-4	1,800		
1,3-Dinitrobenzene	1,3-DNB	99-65-0	6.1		
2,4-Dinitrotoluene[g]	2,4-DNT	121-14-2	0.72	0.00004	0.0008
2,6-Dinitrotoluene[g]	2,6-DNT	606-20-2	0.72	0.00004	0.0008
2-Amino-4,6-dinitrotoluene	2-Am-DNT	35572-78-2	12		
2-Nitrotoluene	2-NT	88-72-2	0.88		
3-Nitrotoluene	3-NT	99-08-1	730		
4-Amino-2,6-dinitrotoluene	4-Am-DNT	19406-51-0	12		
4-Nitrotoluene	4-NT	99-99-0	12		
Nitrobenzene	NB	98-05-3	20	0.007	0.1
Methyl-2,4,6-trinitrophenylnitramine	Tetryl	479-45-8	610		
Pentaerythrite tetranitrate	PETN	78-11-5			
Nitroglycerin	NG	55-63-0	35		
Metals					
Aluminum	Al	7429-90-5	76,000		
Antimony	Sb	7440-36-0	31	0.30	5
Barium	Ba	7440-38-2	5,400	82	1,600
Cadmium	Cd	7440-43-9	37	0.4	8
Chromium[h]	Cr	7440-47-3	210	2	38
Cobalt	Co	7440-48-4	900		
Copper	Cu	7440-50-8	3,100		
Iron	Fe	7439-89-6	23,000		
Lead	Pb	7439-92-1	400		
Magnesium	Mg	7439-95-4			
Manganese	Mn	7439-96-5	1,800		
Molybdenum	Mo	7439-98-7	390		
Mercury	Hg	7439-97-6	23		
Nickel	Ni	7440-02-0	1,600	7	130
Strontium	Sr	7440-24-6	47,000		
Titanium	Ti	7440-32-6	100,000		
Zinc	Zn	7440-66-6	23,000	620	12,000
Phosphorus (white)	WP or P_4	7723-14-0	1.6		
Perchlorate	$C1O_4$	14797-73-0	7.8		
PAHs					
Acenaphthene		83-32-0	3,700	29	570
Acenaphthylene[i]		120-12-7	2,300		
Anthracene		120-12-7	22,000	590	12,000
Benzo(a)anthracene		56-55-3	0.62	0.08	2
Benzo(b)fluoranthene		205-99-2	0.62	0.2	5

Table 4 (Cont.)
Human Health Screening Criteria for Soil/Sediment at Oregon Sites [a]

Analyte	Abbreviation	EPA Region 9 Human Health Screening Values			
		CAS No.	Residential PRG[b] (mg/kg)	SSLs[c] DAF=1 (mg/kg)	SSLs[c] DAF=20 (mg/kg)
Benzo(k)fluoranthene		207-08-9	6.2	2	49
Benzo(g,h,i)perylene[i]		191-24-2	2,300		
Benzo(a)pyrene		50-32-8	0.062	0.4	8
Chrysene		218-01-9	62	8	160
Dibenz(a)anthracene		53-70-3	0.062	0.08	2
Fluoranthene		206-40-0	2,300	210	4,300
Fluorene		86-73-7	2,700	28	560
Indeno(1,2,3-cd)pyrene		139-39-5	0.62	0.7	14
Naphthalene		91-20-3	56	4	84
Phenanthrene[i]		None	2,300		
Pyrene		129-00-0	2,300	210	4,200

DAF = Dilution Attenuation Factor
mg/kg = milligrams per kilogram
mg/L = milligrams per liter
PRG = Preliminary Remediation Goal
SSL = Soil Screening Level

a If laboratory cannot meet any of the preferred QLs with routine SW 846 methodology (as supported by MDLs that are no greater than 1/3 QL), laboratory's QL must be identified in laboratory submittal as failing to meet the QL. Some screening values cannot be obtained with routine methodology to the QL. In those cases, the QL achievable with a routine SW 846 methodology would be accepted.
b PRGs from Region 9 PRG Table dated October 2004 and addendum dated 28 December 2004, based on single chemical.
c SSLs from Region 9 PRG Table dated October 2004 and revision note dated 28 December 2004.
d Soil cleanup levels from Oregon DEQ Hazardous Substance Remedial Action Rules, dated 27 July 2000. OAR 340-122-045(1) through (5), Table 1.
e Concentrations from Oregon DEQ Hazardous Substance Remedial Action Rules, dated 27 July 2000. OAR 340-122-045(7), Appendix 1.
f Concentrations from Oregon DEQ Hazardous Substance Remedial Action Rules, dated 27 July 2000. OAR 340-122-045(6)(a), Appendix 1.
g Carcinogenic DNT mixture values used if more conservative than noncarcinogenic isomer-specific values.
h Total chromium values used.
i Based on PRG for pyrene as a surrogate value.

Table 5
Human Health Screening Criteria for Groundwater at Oregon Sites [a]

Analyte	Abbreviation	Cas No.	EPA Region 9 Tap Water PRG[b] (µg/L)	Federal Drinking Water Criteria MCLs[c] (µg/L)
Hexahydro-1,3,5-trinitro-1,3,5-triazine	RDX	121-82-4	0.61	
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	HMX	2691-41-0	1,800	
2,4,6-Trinitrotoluene	2,4,6-TNT	118-96-7	2.2	
1,3,5-Trinitrobenzene	1,3,5-TNB	99-35-4	1,100	
1,3-Dinitrobenzene	1,3-DNB	99-65-0	3.6	
2,4-Dinitrotoluene[e]	2,4-DNT	121-14-2	0.099	
2,6-Dinitrotoluene[e]	2,6-DNT	606-20-2	0.099	
2-Amino-4,6-dinitrotoluene	2-Am-DNT	35572-78-2	7.3	
2-Nitrotoluene	2-NT	88-72-2	0.049	
3-Nitrotoluene	3-NT	99-08-1	120	
4-Amino-2,6-dinitrotoluene	4-Am-DNT	19406-51-0	7.3	
4-Nitrotoluene	4-NT	99-99-0	0.66	
Nitrobenzene	NB	98-05-3	3.4	
Methyl-2,4,6-trinitrophenylnitramine	Tetryl	479-45-8	360	
Pentaerythrite tetranitrate	PETN	78-11-5		
Nitroglycerin	NG	55-63-0	4.8	
Metals/Inorganics				
Aluminum	Al	7429-90-5	36,000	50[f]
Antimony	Sb	7440-36-0		
Barium	Ba	7440-38-2	2,600	2,000
Cadmium	Cd	7440-43-9	18	5
Chromium[f]	Cr	7440-47-3	110	100
Cobalt	Co	7440-48-4	730	
Copper	Cu	7440-50-8	1,500	1,000[f]
Iron	Fe	7439-89-6	11,000	300[f]
Lead	Pb	7439-92-1		15[h]
Magnesium	Mg	7439-95-4		
Manganese	Mn	7439-96-5	880	50[f]
Mercury	Hg	7439-97-6	11	2
Molybdenum	Mo	7439-98-7	180	
Nickel	Ni	7440-02-0	730	
Perchlorate	$C1O_4$	7601-90-3	3.6	
Phosphorus (white)	WP or P_4	7723-14-0	0.73	
Strontium	Sr	7440-24-6	22,000	
Titanium	Ti	7440-32-6	150,000	
Zinc	Zn	7440-66-6	11,000	5,000[f]

Table 5 (Cont.)
Human Health Screening Criteria for Groundwater at Oregon Sites [a]

MCL = Maximum Contaminant Level
PRG = Preliminary Remediation Goal
µg/L = micrograms per liter

[a] If laboratory cannot meet these QLs with routine SW 846 methodology (as supported by MDLs that are no greater than 1/3 QL), laboratory's QL must be identified in laboratory submittal as failing to meet the QL. Some screening values cannot be obtained with routine methodology to the QL. Note that no surface water samples are planned at this time. If surface water is collected, additional human health screening criteria will be compiled.
[b] Region 9 PRG Table dated October 2004 and revision note dated 28 December 2004, based on single chemical.
[c] Primary MCL from the 2004 Edition of the Drinking Water Standards and Health Advisories, dated Winter 2004, is listed unless otherwise indicated.
[e] Carcinogenic DNT mixture values used if more conservative than noncarcinogenic isomer-specific values.
[f] Secondary MCL from the 2004 Edition of the Drinking Water Standards and Health Advisories, dated Winter 2004.
[g] Total chromium values used if available.
[h] Action level from the 2004 Edition of the Drinking Water Standards and Health Advisories, dated Winter 2004.
[j] Value from the 2004 Edition of the Drinking Water Standards and Health Advisories, dated Winter 2004, Drinking Water Advisory Table.

Table 6
Selection of Ecological Soil Screening Toxicity Values for Constituents of Potential Ecological Concern (Oregon Sites)

Parameter	ODEQ Level II Screening Level [a]	Proposed Benchmarks									Potential Bioaccumulative Constituent? [h]	Final Ecological Screening Value Soil [i]	Practical Quantitation Limit
	Lowest Value for Plants/Inverts./ Birds/Mammals (mg/kg)	Region 5 ESLs [b] (2003) (mg/kg)	Region 7 [c] (mg/kg)		Region 8 [d] (mg/kg)		Region 10 [e] (mg/kg)		Other Values: Talmage et al. (1999) [f] or LANL (2005) [g] (mg/kg)			(mg/kg)	(mg/kg)
Metals/Inorganics													
Aluminum	50	NVA	50	EPA-R4	NVA		50	EPA-R4	5.5	LANL		50	20.0
Antimony	5	0.142	0.27	SSL	0.27	SSL	0.27	SSL	0.05	LANL	Yes	5	0.5
Barium	85	1.04	330	SSL	330	SSL	330	SSL	110	LANL		85	0.5
Cadmium	4	0.00222	0.36	SSL	0.36	SSL	0.36	SSL	0.27	LANL	Yes	4	0.5
Chromium (total)	0.4	0.4	26	SSL	26	SSL	26	SSL	2.3	LANL	Yes	0.4	1.0
Cobalt	20	0.14	13	SSL	13	SSL	13	SSL	13	LANL		20	0.5
Copper	50	5.4	60	ORNL	190	Dutch	60	ORNL	10	LANL	Yes	50	1.0
Iron	10	NVA	200	EPA-R4	NVA		200	EPA-R4	NVA			10	15.0
Lead	16	0.0537	11	SSL	11	SSL	11	SSL	14	LANL	Yes	16	1.0
Magnesium	NVA	NVA	440000	EPA-R4	NVA		440000	EPA-R4	NVA			NVA/Nutrient	25.0
Manganese	100	NVA	100	EPA-R4	NVA		100	EPA-R4	50	LANL		100	0.5
Mercury	0.1	0.1	0.00051	ORNL	0.00051	ORNL	0.00051	ORNL	0.013	LANL	Yes	0.1	0.06
Molybdenum	2	NVA	2	ORNL	2	ORNL	2	ORNL	NVA			2	0.5
Nickel	30	13.6	30	ORNL	30	ORNL	30	ORNL	20	LANL	Yes	30	1.0
Perchlorate	NVA	NVA	NVA		NVA		NVA		NVA			NVA	
Phosphorus (white)	NVA	NVA	NVA		NVA		NVA		NVA			NVA	
Strontium	32875	NVA	NVA		NVA		NVA		96	LANL		32875	
Titanium	1000	NVA	NVA		NVA		NVA		72	LANL		1000	
Zinc	50	6.62	8.5	ORNL	8.5	ORNL	8.5	ORNL	10	LANL	Yes	50	2.0
PAHs													
1-Methylnaphthalene	NVA	NVA	NVA		NVA		NVA		NVA			2.5 (surrogate)	0.015
2-Methylnaphthalene	NVA	3.24	NVA		NVA		NVA		2.5	LANL		2.5	0.015
Acenaphthene	20	682	20	ORNL	20	ORNL	20	ORNL	0.25	LANL	Yes	20	0.015
Acenaphthylene	NVA	682	682	EPA-R4	NVA		682	EPA-R4	120	LANL	Yes	682	0.015
Anthracene	NVA	1480	0.1	EPA-R4	NVA		0.1	EPA-R4	210	LANL	Yes	0.1	0.015
Benzo(a)anthracene	NVA	5.21	5.21	EPA-R4	NVA		5.21	EPA-R4	3.0	LANL	Yes	5.21	0.015
Benzo(a)pyrene	125	1.52	0.1	EPA-R4	NVA		0.1	EPA-R4	9.6	LANL	Yes	125	0.015
Benzo(b)fluoranthene	NVA	59.8	59.8	EPA-R4	NVA		59.8	EPA-R4	18	LANL	Yes	59.8	0.015
Benzo(k)fluoranthene	NVA	148	148	EPA-R4	NVA		148	EPA-R4	62	LANL	Yes	148	0.015
Benzo(g,h,i)perylene	NVA	119	119	EPA-R4	NVA		119	EPA-R4	24	LANL	Yes	119	0.015
Chrysene	NVA	4.73	4.73	EPA-R4	NVA		4.73	EPA-R4	2.4	LANL	Yes	4.73	0.015
Dibenz(a,h)anthracene	NVA	18.4	18.4	EPA-R4	NVA		18.4	EPA-R4	12	LANL	Yes	18.4	0.015
Dibenzofuran	0.002	NVA	NVA		NVA		NVA		6.1	LANL		0.002	0.015
Fluoranthene	NVA	122	0.1	EPA-R4	NVA		0.1	EPA-R4	22	LANL	Yes	0.1	0.015
Fluorene	30	122	122	EPA-R4	NVA		122	EPA-R4	4.1	LANL	Yes	30	0.015
Indeno(1,2,3-cd)pyrene	NVA	109	109	EPA-R4	NVA		109	EPA-R4	62	LANL	Yes	109	0.015
Naphthalene	10	0.0994	0.1	EPA-R4	NVA		0.1	EPA-R4	0.34	LANL		10	0.015
Phenanthrene	NVA	45.7	0.1	EPA-R4	NVA		0.1	EPA-R4	10	LANL	Yes	0.1	0.015
Pyrene	NVA	78.5	0.1	EPA-R4	NVA		0.1	EPA-R4	18	LANL	Yes	0.1	0.015
Explosives													
2,4-Dinitrotoluene	NVA	1.28	1.28	EPA-R4	NVA		1.28	EPA-R4	0.52	LANL		1.28	0.040
2,6-Dinitrotoluene	NVA	0.0328	0.0328	EPA-R4	NVA		0.0328	EPA-R4	0.37	LANL		0.0328	0.040
2-Amino-4,6-Dinitrotoluene	NVA	NVA	NVA		NVA		NVA		2.1	LANL		2.1	0.040
4-Amino-2,6-Dinitrotoluene	NVA	NVA	NVA		NVA		NVA		0.73	LANL		0.73	0.040
1,3-Dinitrobenzene	NVA	0.655	0.655	EPA-R4	NVA		0.655	EPA-R4	0.073	LANL		0.655	0.020
HMX	NVA	NVA	NVA		NVA		NVA		27	LANL		27	0.050
Nitrobenzene	8	1.31	1.31	EPA-R4	NVA		1.31	EPA-R4	2.2	LANL		8	0.020
RDX	NVA	NVA	NVA		NVA		NVA		7.5	LANL		7.5	0.075

Table 6
Selection of Ecological Soil Screening Toxicity Values for Constituents of Potential Ecological Concern (Oregon Sites)

Parameter	ODEQ Level II Screening Level [a]	Proposed Benchmarks									Potential Bioaccumulative Constituent? [h]	Final Ecological Screening Value Soil [i]	Practical Quantitation Limit
	Lowest Value for Plants/Inverts./ Birds/Mammals (mg/kg)	Region 5 ESLs [b] (2003) (mg/kg)	Region 7 [c] (mg/kg)		Region 8 [d] (mg/kg)		Region 10 [e] (mg/kg)		Other Values: Talmage et al. (1999) [f] or LANL (2005) [g] (mg/kg)			(mg/kg)	(mg/kg)
1,3,5-Trinitrobenzene	NVA	0.376	0.376	EPA-R4	NVA		0.376	EPA-R4	6.6	LANL		0.376	0.020
2,4,6-Trinitrotoluene	NVA	NVA	NVA		NVA		NVA		6.4	LANL		6.4	0.040
2-Nitrotoluene	NVA	NVA	NVA		NVA		NVA		2.0	LANL		2.0	0.075
3-Nitrotoluene	NVA	NVA	NVA		NVA		NVA		2.4	LANL		2.4	0.050
4-Nitrotoluene	NVA	NVA	NVA		NVA		NVA		4.4	LANL		4.4	0.040
Nitroglyxcerin	NVA	NVA	NVA		NVA		NVA		71	LANL		71	10
PETN	NVA	NVA	NVA		NVA		NVA		8600	LANL		8600	0.50
Tetryl	NVA	NVA	NVA		NVA		NVA		0.99	LANL		0.99	0.065

NVA: No value available

[a] Oregon Department of Environmental Quality Screening Level Values (December 2001).

[b] Ecological Screening Levels (ESLs), U.S.EPA Region V, August 2003.

[c] USEPA Region 7: Catherine Wooster-Brown (Eco Risk Assessor) recommends the following hierarchy: USEPA EcoSSLs; ORNL Effroymson values; USEPA Region 4 values; other published values.

[d] USEPA Region 8: Dale Hoff (Eco Risk Assessor) recommends the following hierarchy: USEPA SSLs; Dutch Intervention Values or ORNL Effroymson values.

[e] USEPA Region 10: Joseph Goulet (Eco Risk Assessor) says Region 10 has no recommended hierarchy, therefore, values from the USEPA Region 7 Approach were used.

[f] Talmage, S.S., D.M. Opresko, C.J. Maxwell, C.J.E. Welsh, F.M. Cretella, P.H. Reno, and F.B. Daniel, 1999, Nitroaromatic Munition Compounds: Environmental Effects and Screening Values, **Rev. Environ. Contam. Toxicol.**

[g] Los Alamos National Laboratory (LANL), Eco Risk Database, Release 2.2, September 2005.

[h] Potential bioaccumulative constituents will be evaluated in more detail, as some screening values do not take into account bioaccumulation.
Potential bioaccumulative potential from: B*ioaccumulation and Interpretation for the Purposes of Sediment Quality Assessment: Status and Needs* (USEPA, 2000) and ODEQ EQSLVs (ODEQ, 2001).

[i] Final Screening Value selected using the following hierarchy:
1. State Value (Oregon)
2. USEPA Region State Located In (USEPA Region 10)
3. Lower of Talmage et al. (1999) or LANL (2005) values.

EPA-R4=USEPA Region 4
LANL= Los Alamos National Laboratory
SSL=USEPA Eco Soil Screening Levels
Dutch=Dutch Intervention Values
ORNL= Oak Ridge National Laboratory Ecological PRGs (Efroymson et al)

Other References:

U.S. Environmental Protection Agency, 2005, *Guidance for Developing Ecological Soil Screening Levels (Eco-SSLs)* , Office of Solid Waste and Emergency Response, Website version last updated March 15, 2005: http://www.epa.gov/ecotox/ecossl.

U.S. Environmental Protection Agency, 2001, *Supplemental Guidance to RAGS: Region 4 Bulletins, Ecological Risk Assessment* . Originally published November 1995. Website version last updated November 30, 2001: http://www.epa.gov/region4/waste/ots/ecolbul.htm.

Efroymson, R.A., Suter II, G.W., Sample, B.E. and Jones, D.S., 1997. Preliminary Remediation Goals for Ecological Endpoints. Lockheed Martin Energy Systems, Inc. (ORNL) ES/ER/TM-162/R2.

Dutch Intervention Values:

Swartjes, F.A. 1999. R*isk-based Assessment of Soil and Groundwater Quality in the Netherlands: Standards and Remediation Urgency* . Risk Analysis 19(6): 1235-1249

The Netherlands Ministry of Housing, Spatial Planning and Environment's Circular on target values and intervention values for soil remediation http://www2.minvrom.nl/Docs/internationaal/S_I2000.pdf and Annex A: Target Values, Soil Remediation Intervention Values and Indicative Levels for Serious Contamination http://www2.minvrom.nl/Docs/internationaal/annexS_I2000.pdf were also consulted.

Table 7
Selection of Ecological Surface Water Screening Toxicity Values for Constituents of Potential Ecological Concern (Oregon Sites)

Parameter	ODEQ Screening Level Values[a] (mg/L) Freshwater	Region 5 Ecological Screening Levels[b] (mg/L)	EPA Region 7 [c] (mg/L)		EPA Region 8 [d] (mg/L)		EPA Region 10 [e] (mg/L)		Other Ecological Screening Values[f] (mg/L)		Potential Bioaccumulative Constituent? [g]	Final Ecological Value Surface Water [h] (mg/L)
Metals/Inorganics												
Aluminum	8.70E-02	NVA	8.70E-02	AWQC	8.70E-02	AWQC	8.70E-02	AWQC	8.70E-02	LANL		8.70E-02
Antimony	1.00E+00	8.00E-02	3.00E-02	EPRG	3.00E-02	Tier II	3.00E-02	EPRG	1.00E-01	LANL	Yes	1.00E+00
Barium	4.00E-03	2.20E-01	4.00E-03	EPRG	4.00E-03	Tier II	4.00E-03	EPRG	3.80E-03	LANL		4.00E-03
Beryllium	5.30E-03	3.60E-03	6.60E-04	EPRG	6.60E-04	Tier II	6.60E-04	EPRG	5.30E-03	LANL	Yes	5.30E-03
Cadmium	2.20E-03	1.50E-04	2.50E-04	AWQC	2.50E-04	AWQC	2.50E-04	AWQC	1.50E-04	LANL	Yes	2.20E-03
Chromium (Cr-III)	7.40E-02	4.20E-02	7.40E-02	AWQC	7.40E-02	AWQC	7.40E-02	AWQC	7.70E-02	LANL	Yes	7.40E-02
Cobalt	2.30E-02	2.40E-02	2.30E-02	EPRG	2.30E-02	Tier II	2.30E-02	EPRG	3.00E-03	LANL		2.30E-02
Copper	9.00E-03	1.58E-03	9.00E-03	AWQC	9.00E-03	AWQC	9.00E-03	AWQC	5.00E-03	LANL	Yes	9.00E-03
Iron	1.00E+00	NVA	1.00E+00	AWQC	1.00E+00	AWQC	1.00E+00	AWQC	1.00E+00	LANL		1.00E+00
Lead	2.50E-03	1.17E-03	2.50E-03	AWQC	2.50E-03	AWQC	2.50E-03	AWQC	1.20E-03	LANL	Yes	2.50E-03
Magnesium	8.20E+01	NVA	NVA		NVA		NVA		NVA			8.20E+01
Manganese	1.20E-01	NVA	1.20E-01	EPRG	1.20E-01	Tier II	1.20E-01	EPRG	8.00E-02	LANL		1.20E-01
Mercury	7.70E-04	1.30E-06	7.70E-01	AWQC	7.70E-01	AWQC	7.70E-01	AWQC	7.70E-04	LANL	Yes	7.70E-04
Molybdenum	3.70E-01	NVA	3.70E-01	EPRG	3.70E-01	Tier II	3.70E-01	EPRG	NVA			3.70E-01
Nickel	5.20E-02	2.89E-02	5.20E-02	AWQC	5.20E-02	AWQC	5.20E-02	AWQC	2.80E-02	LANL	Yes	5.20E-02
Perchlorate	NVA	NVA	NVA		NVA		NVA		3.50E+01	LANL		3.50E+01
Phosphorus (white)	NVA	NVA	NVA		NVA		NVA		NVA			NVA
Strontium	1.50E+00	NVA	1.50E+00	EPRG	1.50E+00	Tier II	1.50E+00	EPRG	6.20E-01	LANL		1.50E+00
Titanium	NVA	NVA	NVA		NVA		NVA		7.00E+01	LANL		7.00E+01
Zinc	1.20E-01	6.57E-02	1.20E-01	AWQC	1.20E-01	AWQC	1.20E-01	AWQC	6.60E-02	LANL	Yes	1.20E-01
PAHs												
1-Methylnaphthalene	2.10E-03	NVA	NVA		2.10E-03	Tier II	NVA		NVA			2.10E-03
2-Methylnaphthalene	NVA	3.30E-01	NVA		NVA		NVA		2.00E-03	LANL		2.00E-03
Acenaphthene	5.20E-01	3.80E-02	2.30E-02	EPRG	5.80E-03	CCME	2.30E-02	EPRG	2.30E-02	LANL	Yes	5.20E-01
Acenaphthylene	NVA	4.84E+00	NVA		NVA		NVA		3.00E-02	LANL	Yes	3.00E-02
Anthracene	1.30E-02	3.50E-05	7.30E-04	EPRG	7.30E-04	Tier II	7.30E-04	EPRG	1.30E-06	LANL	Yes	1.30E-02
Benzo(a)anthracene	2.70E-05	2.50E-05	2.70E-05	EPRG	2.70E-05	Tier II	2.70E-05	EPRG	2.70E-05	LANL	Yes	2.70E-05
Benzo(a)pyrene	1.40E-05	1.40E-05	1.40E-05	EPRG	1.40E-05	Tier II	1.40E-05	EPRG	1.40E-05	LANL	Yes	1.40E-05
Benzo(b)fluoranthene	NVA	9.07E-03	NVA		NVA		NVA		3.00E-02	LANL	Yes	3.00E-02
Benzo(k)fluoranthene	NVA	NVA	NVA		NVA		NVA		3.00E-02	LANL	Yes	3.00E-02
Benzo(g,h,i)perylene	NVA	7.64E-03	NVA		NVA		NVA		3.00E-02	LANL	Yes	3.00E-02
Chrysene	NVA	NVA	NVA		NVA		NVA		3.00E-02	LANL	Yes	3.00E-02
Dibenz(a,h)anthracene	NVA	NVA	NVA		NVA		NVA		3.00E-02	LANL	Yes	3.00E-02
Dibenzofuran	3.70E-03	4.00E-03	3.70E-03	EPRG	3.70E-03	Tier II	3.70E-03	EPRG	NVA			3.70E-03
Fluoranthene	6.16E-03	1.90E-03	6.20E-03	EPRG	4.00E-05	CCME	6.20E-03	EPRG	6.10E-03	LANL	Yes	6.16E-03
Fluorene	3.90E-03	1.90E-02	3.90E-03	EPRG	3.90E-03	Tier II	3.90E-03	EPRG	3.90E-03	LANL	Yes	3.90E-03
Indeno(1,2,3-cd)pyrene	NVA	4.31E-03	NVA		NVA		NVA		3.00E-02	LANL	Yes	3.00E-02
Naphthalene	6.20E-01	1.30E-02	1.20E-02	EPRG	1.20E-02	Tier II	1.20E-02	EPRG	2.30E-02	LANL		6.20E-01
Phenanthrene	6.30E-03	3.60E-03	6.30E-03	EPRG	4.00E-04	CCME	6.30E-03	EPRG	6.30E-03	LANL	Yes	6.30E-03
Pyrene	NVA	3.00E-04	NVA		2.50E-05	CCME	NVA		3.00E-02	LANL	Yes	3.00E-02
Explosives												
RDX	NVA	NVA	NVA		NVA		NVA		1.90E-01	TAL		1.90E-01
HMX	NVA	NVA	NVA		NVA		NVA		3.30E-01	TAL		3.30E-01
1,3-Dinitrobenzene	NVA	2.20E-02	NVA		NVA		NVA		2.00E-02	TAL		2.00E-02
1,3,5-Trinitrobenzene	NVA	NVA	NVA		NVA		NVA		1.00E-02	TAL		1.00E-02

Table 7
Selection of Ecological Surface Water Screening Toxicity Values for Constituents of Potential Ecological Concern (Oregon Sites)

Parameter	ODEQ Screening Level Values[a] (mg/L) Freshwater	Region 5 Ecological Screening Levels[b] (mg/L)	EPA Region 7 [c] (mg/L)		EPA Region 8 [d] (mg/L)		EPA Region 10 [e] (mg/L)		Other Ecological Screening Values[f] (mg/L)		Potential Bioaccumulative Constituent? [g]	Final Ecological Value Surface Water [h] (mg/L)
2-Nitrotoluene	NVA	NVA	NVA		NVA		NVA		8.00E+00	LANL		8.00E+00
3-Nitrotoluene	NVA	NVA	NVA		NVA		NVA		9.60E+00	LANL		9.60E+00
4-Nitrotoluene	NVA	NVA	NVA		NVA		NVA		1.70E+01	LANL		1.70E+01
2,4-Dinitrotoluene	2.30E-01	4.40E-02	NVA		NVA		NVA		3.10E-01	LANL		2.30E-01
2,6-Dinitrotoluene	2.30E-01	8.10E-02	NVA		NVA		NVA		6.00E-02	LANL		2.30E-01
2-Amino,4,6-Dinitrotoluene	NVA	NVA	NVA		NVA		NVA		2.00E-02	TAL		2.00E-02
4-Amino-2,6-Dinitrotoluene	NVA	NVA	NVA		NVA		NVA		8.60E+00	LANL		8.60E+00
2,4,6-Trinitrotoluene	NVA	NVA	NVA		NVA		NVA		9.00E-02	TAL		9.00E-02
Nitrobenzene	5.40E-01	2.20E-01	NVA		NVA		NVA		2.70E-01	LANL		5.40E-01
Nitroglycerin	NVA	NVA	NVA		NVA		NVA		4.30E+02	LANL		4.30E+02
PETN	NVA	NVA	NVA		NVA		NVA		2.60E+04	LANL		2.60E+04
Tetryl	NVA	NVA	NVA		NVA		NVA		5.80E+00	LANL		5.80E+00

NVA = No Value Available

[a] Oregon Department of Environmental Quality Screening Level Values (December 2001).

[b] Ecological Screening Levels (ESLs), U.S.EPA Region 5, August 2003.

[c] USEPA Region 7: Catherine Wooster-Brown (Eco Risk Assessor) recommends the following hierarchy: National Ambient Water Quality Criteria; ORNL Effroymson values (ORNL, 1977).

[d] USEPA Region 8: Dale Hoff (Eco Risk Assessor) recommends the following hierarchy: National Ambient Water Quality Criteria; Great Lakes Tier II Values; Canadian Environmental Quality Guidelines (CCME, 2003) or ORNL Effroymson values (ORNL, 1977).

[e] USEPA Region 10: Joseph Goulet (Eco Risk Assessor) says Region 10 has no recommended hierarchy, therefore, values from the USEPA Region 7 Approach were used.

[f] Talmage, S.S., D.M. Opresko, C.J. Maxwell, C.J.E. Welsh, F.M. Cretella, P.H. Reno, and F.B. Daniel (TAL), 1999, *Nitroaromatic Munition Compounds: Environmental Effects and Screening Values.* **Rev. Environ. Contam. Toxicol.**
Los Alamos National Laboratory (LANL), Eco Risk Database, Release 2.2, September 2005.

[g] Potential bioaccumulative constituents will be evaluated in more detail, as some screening values do not take into account bioaccumulation.
Potential bioaccumulative potential from: *Bioaccumulation and Interpretation for the Purposes of Sediment Quality Assessment: Status and Needs* (USEPA, 2000) and ODEQ EQSLVs (ODEQ, 2001).

[h] Final Screening Value selected using the following hierarchy:
1. State Value (Oregon)
2. USEPA Region State Located In (USEPA Region 10)
3. Lower of Talmage et al. [TAL] (1999) or LANL (2005) values.

AWQC=National Ambient Water Quality Criteria
LANL= Los Alamos National Laboratory
Tier II=Great Lakes Tier II Water Quality Criteria
EPRGs=Oak Ridge National Laboratory Ecological PRGs
TAL=Talmage et al (1999)
CCME=Canadian Council of Ministers of the Environment, Environmental Quality Guidelines

Other References:
Efroymson, R.A., et al., 1997, P*reliminary Remediation Goals* (EPRGs), ORNL, ES/ER/TM-162/R2,
Canadian Environmental Quality Guidelines (for Freshwater) Summary Table, CCME, December 2003.
Great Lakes Tier II Values from Suter, G.W. and C.L. Tsao, 1996, *Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Rev* , ES/ER/TM-96/R2.
National AWQC from USEPA Water Quality Criteria Web Site: http://www.epa.gov/waterscience/criteria/wqcriteria.html

Table 8
Selection of Ecological Sediment Screening Toxicity Values for Constituents of Potential Ecological Concern (Oregon Sites)

Parameter	ODEQ Screening Level Values [a] (mg/kg) Freshwater	Region 5 Ecological Screening Levels [b] (mg/kg)	EPA Region 7 [c] (mg/kg)		EPA Region 8 [d] (mg/kg)		EPA Region 10 [e] (mg/kg)		Other Ecological Screening Levels [f] (mg/kg)		Potential Bioaccumulative Constituent? [g]	Final Ecological Screening Value Sediment [h] (mg/kg)	Practical Quantitation Limit (mg/kg)
Metals/Inorganics													
Aluminum	NVA	NVA	NVA		NVA		NVA		2.80E+02	LANL		2.80E+02	20.0
Antimony	3.00E+00	NVA	NVA		NVA		NVA		3.60E-01	LANL		3.00E+00	0.5
Barium	NVA	NVA	NVA		NVA		NVA		4.80E+01	LANL		4.80E+01	0.5
Cadmium	3.00E-03	9.90E-01	9.90E-01	MAC	9.90E-01	MAC	9.90E-01	MAC	3.30E-01	LANL	Yes	3.00E-03	0.5
Chromium	3.70E+01	4.34E+01	4.34E+01	MAC	4.34E+01	MAC	4.34E+01	MAC	5.60E+01	LANL	Yes	3.70E+01	1.0
Cobalt	NVA	5.00E+01	NVA		NVA		NVA		2.30E+02	LANL		2.30E+02	0.5
Copper	1.00E+01	3.16E+01	3.16E+01	MAC	3.16E+01	MAC	3.16E+01	MAC	1.70E+01	LANL	Yes	1.00E+01	1.0
Iron	NVA	NVA	NVA		NVA		NVA		2.00E+01	LANL		2.00E+01	15.0
Lead	3.50E+01	3.58E+01	3.58E+01	MAC	3.58E+01	MAC	3.58E+01	MAC	2.70E+01	LANL	Yes	3.50E+01	1.0
Magnesium	NVA	NVA	NVA		NVA		NVA		NVA			NVA	25.0
Manganese	1.10E+03	NVA	NVA		NVA		NVA		7.20E+02	LANL		1.10E+03	0.5
Mercury	2.00E-01	1.74E-01	1.80E-01	MAC	1.80E-01	MAC	1.80E-01	MAC	1.80E-02	LANL	Yes	2.00E-01	0.06
Molybdenum	NVA	NVA	NVA		NVA		NVA		NVA			NVA	0.5
Nickel	1.80E+01	2.27E+01	2.27E+01	MAC	2.27E+01	MAC	2.27E+01	MAC	3.90E+01	LANL	Yes	1.80E+01	1.0
Phosphorus	NVA	NVA	NVA		NVA		NVA		NVA			NVA	
Strontium	NVA	NVA	NVA		NVA		NVA		1.70E+03	LANL		1.70E+03	
Titanium	NVA	NVA	NVA		NVA		NVA		9.80E+01	LANL		9.80E+01	
Zinc	3.00E+00	1.21E+02	1.21E+02	MAC	1.21E+02	MAC	1.21E+02	MAC	3.70E+01	LANL	Yes	3.00E+00	2.0
PAHs													
1-Methylnaphthalene	NVA	NVA	NVA		NVA		NVA		NVA			0.18 (surrogate)	0.015
2-Methylnaphthalene	NVA	2.02E-02	NVA		2.00E-02	ISQG	NVA		1.80E-01	LANL		1.80E-01	0.015
Acenaphthene	2.90E+02	6.71E-03	8.90E-02	EPRG	6.70E-03	ISQG	8.90E-02	EPRG	6.20E-01	LANL	Yes	2.90E+02	0.015
Acenaphthylene	1.60E+02	5.87E-03	1.30E-01	EPRG	5.87E-03	ISQG	1.30E-01	EPRG	4.40E-02	LANL	Yes	1.60E+02	0.015
Anthracene	5.70E+01	5.72E-02	5.72E-02	MAC	5.72E-02	MAC	5.72E-02	MAC	3.90E-04	LANL	Yes	5.70E+01	0.015
Benzo(a)anthracene	3.20E+01	1.08E-01	1.08E-01	MAC	1.08E-01	MAC	1.08E-01	MAC	1.10E-01	LANL	Yes	3.20E+01	0.015
Benzo(a)pyrene	3.20E+01	1.50E-01	1.50E-01	MAC	1.50E-01	MAC	1.50E-01	MAC	3.50E-01	LANL	Yes	3.20E+01	0.015
Benzo(b)fluoranthene	NVA	1.04E+01	4.00E+00	EPRG	4.00E+00	EPRG	4.00E+00	EPRG	2.40E-01	LANL	Yes	4.00E+00	0.015
Benzo(k)fluoranthene	2.70E+01	2.40E-01	4.00E+00	EPRG	4.00E+00	EPRG	4.00E+00	EPRG	2.40E-01	LANL	Yes	2.70E+01	0.015
Benzo(g,h,i)perylene	3.00E+02	1.70E-01	6.30E+00	EPRG	6.30E+00	EPRG	6.30E+00	EPRG	2.90E-01	LANL	Yes	3.00E+02	0.015
Chrysene	5.70E+01	1.66E-01	1.66E-01	MAC	1.66E-01	MAC	1.66E-01	MAC	5.00E-01	LANL	Yes	5.70E+01	0.015
Dibenz(a,h)anthracene	3.30E+01	3.30E-02	3.30E-02	MAC	3.30E-02	MAC	3.30E-02	MAC	1.50E-02	LANL	Yes	3.30E+01	0.015
Dibenzofuran	5.10E+03	4.49E-01	4.20E-01	EPRG	4.20E-01	EPRG	4.20E-01	EPRG	NVA			5.10E+03	0.015
Fluoranthene	1.11E+02	4.23E-01	4.23E-01	MAC	4.23E-01	MAC	4.23E-01	MAC	2.90E+00	LANL	Yes	1.11E+02	0.015
Fluorene	7.70E+01	7.74E-02	7.74E-02	MAC	7.74E-02	MAC	7.74E-02	MAC	5.40E-01	LANL	Yes	7.70E+01	0.015
Indeno(1,2,3-cd)pyrene	1.70E+01	2.00E-01	8.37E-01	EPRG	8.37E-01	EPRG	8.37E-01	EPRG	7.80E-02	LANL	Yes	1.70E+01	0.015
Naphthalene	1.76E+02	1.76E-01	1.76E-01	MAC	1.76E-01	MAC	1.76E-01	MAC	4.70E-01	LANL		1.76E+02	0.015
Phenanthrene	4.20E+01	2.04E-01	2.04E-01	MAC	2.04E-01	MAC	2.04E-01	MAC	8.50E-01	LANL	Yes	4.20E+01	0.015
Pyrene	5.30E+01	1.95E-01	1.95E-01	MAC	1.95E-01	MAC	1.95E-01	MAC	5.70E-01	LANL	Yes	5.30E+01	0.015
Explosives													
RDX	NVA	NVA	NVA		NVA		NVA		1.30E-01	TAL		1.30E-01	0.075
HMX	NVA	NVA	NVA		NVA		NVA		4.70E-02	TAL		4.70E-02	0.050
1,3,5-Trinitrobenzene	NVA	NVA	NVA		NVA		NVA		2.40E-02	TAL		2.40E-02	0.020
1,3-Dinitrobenzene	NVA	8.61E-03	NVA		NVA		NVA		6.70E-02	TAL		6.70E-02	0.020
2,4-Dinitrotoluene	NVA	1.44E-03	NVA		NVA		NVA		2.90E-01	LANL		2.90E-01	0.040
2,6-Dinitrotoluene	NVA	3.98E-03	NVA		NVA		NVA		1.90E+00	LANL		1.90E+00	0.040
2,4,6-TNT	NVA	NVA	NVA		NVA		NVA		9.20E-01	TAL		9.20E-01	0.040

Table 8
Selection of Ecological Sediment Screening Toxicity Values for Constituents of Potential Ecological Concern (Oregon Sites)

Parameter	ODEQ Screening Level Values [a] (mg/kg) Freshwater	Region 5 Ecological Screening Levels [b] (mg/kg)	EPA Region 7 [c] (mg/kg)		EPA Region 8 [d] (mg/kg)		EPA Region 10 [e] (mg/kg)		Other Ecological Screening Levels [f] (mg/kg)		Potential Bioaccumulative Constituent? [g]	Final Ecological Screening Value Sediment [h] (mg/kg)	Practical Quantitation Limit (mg/kg)
2-Amino-4,6,-Dintrotoluene	NVA	NVA	NVA		NVA		NVA		7.00E+00	LANL		7.00E+00	0.040
4-Amino-2,6,-Dintrotoluene	NVA	NVA	NVA		NVA		NVA		1.90E+00	LANL		1.90E+00	0.040
2-Nitrotoluene	NVA	NVA	NVA		NVA		NVA		5.60E+00	LANL		5.60E+00	0.075
3-Nitrotoluene	NVA	NVA	NVA		NVA		NVA		4.90E+00	LANL		4.90E+00	0.050
4-Nitrotoluene	NVA	NVA	NVA		NVA		NVA		1.00E+01	LANL		1.00E+01	0.040
Nitrobenzene	NVA	1.45E-01	NVA		NVA		NVA		3.20E+01	LANL		3.20E+01	0.020
Nitroglycerin	NVA	NVA	NVA		NVA		NVA		1.70E+03	LANL		1.70E+03	10
PETN	NVA	NVA	NVA		NVA		NVA		1.20E+05	LANL		1.20E+05	0.50
Tetryl	NVA	NVA	NVA		NVA		NVA		1.00E+02	LANL		1.00E+02	0.065

NVA = No Value Available

[a] Oregon Department of Environmental Quality Screening Level Values (December 2001).

[b] Ecological Screening Levels (ESLs), U.S.EPA Region V, August 2003.

[c] USEPA Region 7: Catherine Wooster-Brown (Eco Risk Assessor) recommends the following hierarchy: MacDonald Consensus Values (MacDonald, 2000); ORNL Effroymson values (ORNL, 1977).

[d] USEPA Region 8: Dale Hoff (Eco Risk Assessor) recommends the following hierarchy: MacDonald Consensus Values (MacDonald, 2000); Canadian ISQG values (CCME, 2003) or ORNL Effroymson values (ORNL, 1977).

[e] USEPA Region 10: Joseph Goulet (Eco Risk Assessor) says Region 10 has no recommended hierarchy, therefore, values from the USEPA Region 7 Approach were used.

[f] Talmage, S.S., D.M. Opresko, C.J. Maxwell, C.J.E. Welsh, F.M. Cretella, P.H. Reno, and F.B. Daniel (TAL), 1999, *Nitroaromatic Munition Compounds: Environmental Effects and Screening Values* , **Rev. Environ. Contam. Toxicol**. or Los Alamos National Laboratory (LANL), Eco Risk Database, Release 2.2, September 2005.

[g] Potential bioaccumulative constituents will be evaluated in more detail, as some screening values do not take into account bioaccumulation.

Potential bioaccumulative potential from: B*ioaccumulation and Interpretation for the Purposes of Sediment Quality Assessment: Status and Needs* (USEPA, 2000) and ODEQ EQSLVs (ODEQ, 2001).

[h] Final Screening Value selected using the following hierarchy:
1. State Value (Oregon)
2. USEPA Region State Located In (USEPA Region 10)
3. Lower of Talmage et al. [TAL] (1999) or LANL (2005) values.

Note: The Talmage [TAL] screening values assume 10% organic carbon in the sediment.

MAC=MacDonald Consensus Values
EPRGs=Oak Ridge National Laboratory Ecological PRGs
ISQGs=Canadian Interim Sediment Quality Guidelines
LALN=Los Alamos National Laboratory
TAL=Talmage et al (1999)

Other References:

Efroymson, R.A., et al., 1997, P*reliminary Remediation Goals* (EPRGs), ORNL, ES/ER/TM-162/R2,
Canadian Interim Sediment Quality Guidelines (ISQGs) Summary Table, CCME, December 2003.
MacDonald, D.D, C.G. Ingersoll and T.A. Berger, 2000, *Development and Evaluation of Consensus-Based Sediment Quality Criteria for Freshwater Ecosystems* , Archives of Environmental Contamination and Toxicology 39:20-31.

Draft Worksheets

Site Information Worksheet
MRSPP Data Gaps
HRS Data Gaps

Site Information Worksheet

Site: 21 AOCs

Project: Camp Adair

	Site Information Needed[a]	Suggested Means to Obtain Site Information	Potential Source(s) of Site Information	Responsible for Obtaining	Deadline for Obtaining Site Information
1	Background sampling requirements for metals, explosives, perchlorate	ODEQ protocol	ODEQ guidance document	ODEQ	For inclusion in TPP Memo
2	Background metals data	Sampling	Add more samples to field program	Shaw	For inclusion in TPP Memo
3	Locate MEC at 4 of 5 Small Arms Range AOCs	Site recon/consider use of geophysics	Historical aerial photos/review historical documents	Shaw	For inclusion in Site Specific Work Plan
4	Schedule for sampling AOCs	Consultation	ODEQ	Shaw	Prior to field work
5	Inform landowners of site visits	Phone			Prior to field work
6	Lat/Long and x,y on all maps	GIS	Add to maps	Shaw	For inclusion in TPP Memo
7	Point of contact for community	Not applicable			Before start of field work
8	Access agreements	Letters, call, or visit stakeholders	Letters/conversations with stakeholders	USACE	Before start of field work
9	Threatened or endangered species within AOCs	Phone	U.S. Fish and Wildlife	Shaw	For inclusion in TPP Memo
10	Areas of cultural significance within AOCs	SHPO	Phone SHPO	Shaw	For inclusion in TPP Memo

[a] Refer to EM 200-1-2, Paragraphs 1.1.3 and 2.2.

Munitions Response Site Prioritization Protocol (MRSPP) Data Gaps
32 CRF Part 179

Installation: Camp Adair
AOC: Skeet Range No. 580
RMIS Range ID: F10OR0029

Module	Table No.	Table Description	Data Gap	Potential Source of Information to Fill Data Gap	No Data Gap	Description of Known Data
Explosive Hazard Evaluation (EHE)	1	Munitions Type			x	Small Arms (.22 to .50 caliber)
	2	Source of Hazard			x	Former small arms range
	3	Location of Munitions			x	Small Arms (regardless of location)
	4	Ease of Access			x	No Barrier
	5	Status of Property			x	Non-DoD control
	6	Population Density			x	<100 persons per square mile
	7	Population Near Hazard	X	0 inhabited structures w/in 2 miles		
	8	Activities/Structures			x	Agricutlural - livestock grazing
	9	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	10	**EHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Chemical Warfare Materiel (CWM) Hazard Evaluation (CHE)	11	CWM Configuration			x	Historical evidence indicates that CWM are not present
	12	Sources of CWM			x	Historical evidence indicates that CWM are not present
	13	Location of CWM			x	Historical evidence indicates that CWM are not present
	14	Ease of Access			x	No barrier
	15	Status of Property			x	Non-DoD control
	16	Population Density			x	<100 persons per square mile
	17	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	18	Activities/Structures			x	Agricutlural - livestock grazing
	19	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	20	**CHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Health Hazard Evaluation (HHE)	21	HHE Factor Levels	x	Contaminant hazard evaluation pending analytical results		
	22	HHE Three-Letter Combination Levels	x	Contaminant hazard evaluation pending analytical results		
	23	HHE Module Ratings	x	Contaminant hazard evaluation pending analytical results		
	24	HHE Module Rating	x	Contaminant hazard evaluation pending analytical results		
MRS Priority	**25**	**MRS Priority (Based on Highest Hazard Evaluation Module Rating)**	**x**	**Evaluation pending filling of data gaps**		

To be completed by USACE once all data gaps are filled.

Munitions Response Site Prioritization Protocol (MRSPP) Data Gaps
32 CRF Part 179

Installation: Camp Adair
AOC: Practice Grenade Court No. 120
RMIS Range ID: F10OR0029

Module	Table No.	Table Description	Data Gap	Potential Source of Information to Fill Data Gap	No Data Gap	Description of Known Data
Explosive Hazard Evaluation (EHE)	1	Munitions Type			x	M21 and Mk 1A1 practice hand grenades
	2	Source of Hazard			x	Practice grenade court
	3	Location of Munitions			x	Suspected historical evidence
	4	Ease of Access			x	No barrier
	5	Status of Property			x	Non-DoD control
	6	Population Density			x	<100 persons per square mile
	7	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	8	Activities/Structures			x	Agricultural - livestock grazing
	9	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	10	**EHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Chemical Warfare Materiel (CWM) Hazard Evaluation (CHE)	11	CWM Configuration			x	Historical evidence indicates that CWM are not present
	12	Sources of CWM			x	Historical evidence indicates that CWM are not present
	13	Location of CWM			x	Historical evidence indicates that CWM are not present
	14	Ease of Access			x	No barrier
	15	Status of Property			x	Non-DoD control
	16	Population Density			x	<100 persons per square mile
	17	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	18	Activities/Structures			x	Agricultural - livestock grazing
	19	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	20	**CHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Health Hazard Evaluation (HHE)	21	HHE Factor Levels			x	No known or suspected MC hazard
	22	HHE Three-Letter Combination Levels			x	No known or suspected MC hazard
	23	HHE Module Ratings			x	No known or suspected MC hazard
	24	HHE Module Rating			x	No known or suspected MC hazard
MRS Priority	**25**	**MRS Priority (Based on Highest Hazard Evaluation Module Rating)**			**x**	**No known or suspected MC hazard**

To be completed by USACE once all data gaps are filled.

Munitions Response Site Prioritization Protocol (MRSPP) Data Gaps
32 CRF Part 179

Installation: **Camp Adair**
AOC: **Practice Grenade Court No. 121**
RMIS Range ID: **F10OR0029**

Module	Table No.	Table Description	Data Gap	Potential Source of Information to Fill Data Gap	No Data Gap	Description of Known Data
Explosive Hazard Evaluation (EHE)	1	Munitions Type			x	M21 and Mk 1A1 practice hand grenades
	2	Source of Hazard			x	Practice grenade court
	3	Location of Munitions			x	Suspected historical evidence
	4	Ease of Access			x	No barrier
	5	Status of Property			x	Non-DoD control
	6	Population Density			x	<100 persons per square mile
	7	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	8	Activities/Structures			x	Agricultural - livestock grazing
	9	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	10	**EHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Chemical Warfare Materiel (CWM) Hazard Evaluation (CHE)	11	CWM Configuration			x	Historical evidence indicates that CWM are not present
	12	Sources of CWM			x	Historical evidence indicates that CWM are not present
	13	Location of CWM			x	Historical evidence indicates that CWM are not present
	14	Ease of Access			x	No barrier
	15	Status of Property			x	Non-DoD control
	16	Population Density			x	<100 persons per square mile
	17	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	18	Activities/Structures			x	Agricultural - livestock grazing
	19	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	20	**CHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Health Hazard Evaluation (HHE)	21	HHE Factor Levels			x	No known or suspected MC hazard
	22	HHE Three-Letter Combination Levels			x	No known or suspected MC hazard
	23	HHE Module Ratings			x	No known or suspected MC hazard
	24	HHE Module Rating			x	No known or suspected MC hazard
MRS Priority	**25**	**MRS Priority (Based on Highest Hazard Evaluation Module Rating)**			**x**	**No known or suspected MC hazard**

To be completed by USACE once all data gaps are filled.

Munitions Response Site Prioritization Protocol (MRSPP) Data Gaps
32 CRF Part 179

Installation: Camp Adair
AOC: Practice Grenade Court No. 122
RMIS Range ID: F10OR0029

Module	Table No.	Table Description	Data Gap	Potential Source of Information to Fill Data Gap	No Data Gap	Description of Known Data
Explosive Hazard Evaluation (EHE)	1	Munitions Type			x	M21 and Mk 1A1 practice hand grenades
	2	Source of Hazard			x	Practice grenade court
	3	Location of Munitions			x	Suspected historical evidence
	4	Ease of Access			x	No barrier
	5	Status of Property			x	Non-DoD control
	6	Population Density			x	<100 persons per square mile
	7	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	8	Activities/Structures			x	Agricultural - livestock grazing
	9	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	10	**EHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Chemical Warfare Materiel (CWM) Hazard Evaluation (CHE)	11	CWM Configuration			x	Historical evidence indicates that CWM are not present
	12	Sources of CWM			x	Historical evidence indicates that CWM are not present
	13	Location of CWM			x	Historical evidence indicates that CWM are not present
	14	Ease of Access			x	No barrier
	15	Status of Property			x	Non-DoD control
	16	Population Density			x	<100 persons per square mile
	17	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	18	Activities/Structures			x	Agricultural - livestock grazing
	19	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	20	**CHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Health Hazard Evaluation (HHE)	21	HHE Factor Levels			x	No known or suspected MC hazard
	22	HHE Three-Letter Combination Levels			x	No known or suspected MC hazard
	23	HHE Module Ratings			x	No known or suspected MC hazard
	24	HHE Module Rating			x	No known or suspected MC hazard
MRS Priority	**25**	**MRS Priority (Based on Highest Hazard Evaluation Module Rating)**			**x**	**No known or suspected MC hazard**

To be completed by USACE once all data gaps are filled.

Munitions Response Site Prioritization Protocol (MRSPP) Data Gaps
32 CRF Part 179

Installation: Camp Adair
AOC: Practice Grenade Court No. 125
RMIS Range ID: F10OR0029

Module	Table No.	Table Description	Data Gap	Potential Source of Information to Fill Data Gap	No Data Gap	Description of Known Data
Explosive Hazard Evaluation (EHE)	1	Munitions Type			x	M21 and Mk 1A1 practice hand grenades
	2	Source of Hazard			x	Practice grenade court
	3	Location of Munitions			x	Suspected historical evidence
	4	Ease of Access			x	No barrier
	5	Status of Property			x	Non-DoD control
	6	Population Density			x	<100 persons per square mile
	7	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	8	Activities/Structures			x	Agricultural - livestock grazing
	9	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	10	**EHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Chemical Warfare Materiel (CWM) Hazard Evaluation (CHE)	11	CWM Configuration			x	Historical evidence indicates that CWM are not present
	12	Sources of CWM			x	Historical evidence indicates that CWM are not present
	13	Location of CWM			x	Historical evidence indicates that CWM are not present
	14	Ease of Access			x	No barrier
	15	Status of Property			x	Non-DoD control
	16	Population Density			x	<100 persons per square mile
	17	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	18	Activities/Structures			x	Agricultural - livestock grazing
	19	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	20	**CHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Health Hazard Evaluation (HHE)	21	HHE Factor Levels			x	No known or suspected MC hazard
	22	HHE Three-Letter Combination Levels			x	No known or suspected MC hazard
	23	HHE Module Ratings			x	No known or suspected MC hazard
	24	HHE Module Rating			x	No known or suspected MC hazard
MRS Priority	**25**	**MRS Priority (Based on Highest Hazard Evaluation Module Rating)**			**x**	**No known or suspected MC hazard**

To be completed by USACE once all data gaps are filled.

Munitions Response Site Prioritization Protocol (MRSPP) Data Gaps
32 CRF Part 179

Installation: Camp Adair
AOC: Practice Grenade Court No. 126
RMIS Range ID: F10OR0029

Module	Table No.	Table Description	Data Gap	Potential Source of Information to Fill Data Gap	No Data Gap	Description of Known Data
Explosive Hazard Evaluation (EHE)	1	Munitions Type			x	M21 and Mk 1A1 practice hand grenades
	2	Source of Hazard			x	Practice grenade court
	3	Location of Munitions			x	Suspected historical evidence
	4	Ease of Access			x	No barrier
	5	Status of Property			x	Non-DoD control
	6	Population Density			x	<100 persons per square mile
	7	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	8	Activities/Structures			x	Agricultural - livestock grazing
	9	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	10	**EHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Chemical Warfare Materiel (CWM) Hazard Evaluation (CHE)	11	CWM Configuration			x	Historical evidence indicates that CWM are not present
	12	Sources of CWM			x	Historical evidence indicates that CWM are not present
	13	Location of CWM			x	Historical evidence indicates that CWM are not present
	14	Ease of Access			x	No barrier
	15	Status of Property			x	Non-DoD control
	16	Population Density			x	<100 persons per square mile
	17	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	18	Activities/Structures			x	Agricultural - livestock grazing
	19	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	20	**CHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Health Hazard Evaluation (HHE)	21	HHE Factor Levels			x	No known or suspected MC hazard
	22	HHE Three-Letter Combination Levels			x	No known or suspected MC hazard
	23	HHE Module Ratings			x	No known or suspected MC hazard
	24	HHE Module Rating			x	No known or suspected MC hazard
MRS Priority	**25**	**MRS Priority (Based on Highest Hazard Evaluation Module Rating)**			**x**	**No known or suspected MC hazard**

To be completed by USACE once all data gaps are filled.

Munitions Response Site Prioritization Protocol (MRSPP) Data Gaps
32 CRF Part 179

Installation: Camp Adair
AOC: Practice Grenade Court No. 127
RMIS Range ID: F10OR0029

Module	Table No.	Table Description	Data Gap	Potential Source of Information to Fill Data Gap	No Data Gap	Description of Known Data
Explosive Hazard Evaluation (EHE)	1	Munitions Type			x	M21 and Mk 1A1 practice hand grenades
	2	Source of Hazard			x	Practice grenade court
	3	Location of Munitions			x	Suspected historical evidence
	4	Ease of Access			x	No barrier
	5	Status of Property			x	Non-DoD control
	6	Population Density			x	<100 persons per square mile
	7	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	8	Activities/Structures			x	Agricultural - livestock grazing
	9	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	10	**EHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Chemical Warfare Materiel (CWM) Hazard Evaluation (CHE)	11	CWM Configuration			x	Historical evidence indicates that CWM are not present
	12	Sources of CWM			x	Historical evidence indicates that CWM are not present
	13	Location of CWM			x	Historical evidence indicates that CWM are not present
	14	Ease of Access			x	No barrier
	15	Status of Property			x	Non-DoD control
	16	Population Density			x	<100 persons per square mile
	17	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	18	Activities/Structures			x	Agricultural - livestock grazing
	19	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	20	**CHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Health Hazard Evaluation (HHE)	21	HHE Factor Levels			x	No known or suspected MC hazard
	22	HHE Three-Letter Combination Levels			x	No known or suspected MC hazard
	23	HHE Module Ratings			x	No known or suspected MC hazard
	24	HHE Module Rating			x	No known or suspected MC hazard
MRS Priority	**25**	**MRS Priority (Based on Highest Hazard Evaluation Module Rating)**			**x**	**No known or suspected MC hazard**

To be completed by USACE once all data gaps are filled.

Munitions Response Site Prioritization Protocol (MRSPP) Data Gaps
32 CRF Part 179

Installation: Camp Adair
AOC: Infiltration Range No. 143
RMIS Range ID: F10OR0029

Module	Table No.	Table Description	Data Gap	Potential Source of Information to Fill Data Gap	No Data Gap	Description of Known Data
Explosive Hazard Evaluation (EHE)	1	Munitions Type	x	Reconnaissance of area		Small arms (.22 to .50 caliber), dynamite, TNT
	2	Source of Hazard			x	Former small arms range
	3	Location of Munitions			x	Suspected historical evidence
	4	Ease of Access			x	No barrier
	5	Status of Property			x	Non-DoD control
	6	Population Density			x	<100 persons per square mile
	7	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	8	Activities/Structures			x	Agricultural - livestock grazing
	9	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	10	**EHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Chemical Warfare Materiel (CWM) Hazard Evaluation (CHE)	11	CWM Configuration			x	Historical evidence indicates that CWM are not present
	12	Sources of CWM			x	Historical evidence indicates that CWM are not present
	13	Location of CWM			x	Historical evidence indicates that CWM are not present
	14	Ease of Access			x	No barrier
	15	Status of Property			x	Non-DoD control
	16	Population Density			x	<100 persons per square mile
	17	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	18	Activities/Structures			x	Agricultural - livestock grazing
	19	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	20	**CHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Health Hazard Evaluation (HHE)	21	HHE Factor Levels			x	No longer Required
	22	HHE Three-Letter Combination Levels			x	No longer Required
	23	HHE Module Ratings			x	No longer Required
	24	HHE Module Rating			x	No longer Required
MRS Priority	**25**	**MRS Priority (Based on Highest Hazard Evaluation Module Rating)**			**x**	**No longer required**

To be completed by USACE once all data gaps are filled.

Munitions Response Site Prioritization Protocol (MRSPP) Data Gaps
32 CRF Part 179

Installation: Camp Adair
AOC: Chemical Identification Area No. 182
RMIS Range ID: F10OR0029

Module	Table No.	Table Description	Data Gap	Potential Source of Information to Fill Data Gap	No Data Gap	Description of Known Data
Explosive Hazard Evaluation (EHE)	1	Munitions Type			x	Tear gas M1; Capsule riot control CS; Chemical ID set Instructional M1 and Detonation M1; Chemical ID Toxic Gas Set M1; Toxic chemical munitions.
	2	Source of Hazard			x	Chemical identification area
	3	Location of Munitions			x	Suspected historical evidence
	4	Ease of Access			x	No barrier
	5	Status of Property			x	Non-DoD control
	6	Population Density			x	<100 persons per square mile
	7	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	8	Activities/Structures			x	Agricultural - livestock grazing
	9	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	10	**EHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Chemical Warfare Materiel (CWM) Hazard Evaluation (CHE)	11	CWM Configuration			x	CAIS, CWM Bulk containers
	12	Sources of CWM			x	Former training facility using CWM or CAIS
	13	Location of CWM			x	Suspected historical evidence
	14	Ease of Access			x	No barrier
	15	Status of Property			x	Non-DoD control
	16	Population Density			x	<100 persons per square mile
	17	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	18	Activities/Structures			x	Agricultural - livestock grazing
	19	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	20	**CHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Health Hazard Evaluation (HHE)	21	HHE Factor Levels			x	No known or suspected MC hazard
	22	HHE Three-Letter Combination Levels			x	No known or suspected MC hazard
	23	HHE Module Ratings			x	No known or suspected MC hazard
	24	HHE Module Rating			x	No known or suspected MC hazard
MRS Priority	**25**	**MRS Priority (Based on Highest Hazard Evaluation Module Rating)**			**x**	**No known or suspected MC hazard**

To be completed by USACE once all data gaps are filled.

Munitions Response Site Prioritization Protocol (MRSPP) Data Gaps
32 CRF Part 179

Installation: Camp Adair
AOC: East Live Hand Grenade Court
RMIS Range ID: F10OR0029

Module	Table No.	Table Description	Data Gap	Potential Source of Information to Fill Data Gap	No Data Gap	Description of Known Data
Explosive Hazard Evaluation (EHE)	1	Munitions Type			x	Mk II hand grenade, M21 practice hand grenade
	2	Source of Hazard			x	Live hand grenade court
	3	Location of Munitions			x	Suspected historical evidence
	4	Ease of Access			x	No barrier
	5	Status of Property			x	Non-DoD control
	6	Population Density			x	<100 persons per square mile
	7	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	8	Activities/Structures			x	Agricultural - livestock grazing
	9	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	10	**EHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Chemical Warfare Materiel (CWM) Hazard Evaluation (CHE)	11	CWM Configuration			x	Historical evidence indicates that CWM are not present
	12	Sources of CWM			x	Historical evidence indicates that CWM are not present
	13	Location of CWM			x	Historical evidence indicates that CWM are not present
	14	Ease of Access			x	No barrier
	15	Status of Property			x	Non-DoD control
	16	Population Density			x	<100 persons per square mile
	17	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	18	Activities/Structures			x	Agricultural - livestock grazing
	19	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	20	**CHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Health Hazard Evaluation (HHE)	21	HHE Factor Levels	x	Contaminant hazard evaluation pending analytical results		
	22	HHE Three-Letter Combination Levels	x	Contaminant hazard evaluation pending analytical results		
	23	HHE Module Ratings	x	Contaminant hazard evaluation pending analytical results		
	24	HHE Module Rating	x	Contaminant hazard evaluation pending analytical results		
MRS Priority	**25**	**MRS Priority (Based on Highest Hazard Evaluation Module Rating)**	**x**	**Evaluation pending filling of data gaps**		

To be completed by USACE once all data gaps are filled.

Munitions Response Site Prioritization Protocol (MRSPP) Data Gaps
32 CRF Part 179

Installation: **Camp Adair**
AOC: **West Live Hand Grenade Court**
RMIS Range ID: **F10OR0029**

Module	Table No.	Table Description	Data Gap	Potential Source of Information to Fill Data Gap	No Data Gap	Description of Known Data
Explosive Hazard Evaluation (EHE)	1	Munitions Type			x	Mk II hand grenade, M21 practice hand grenade
	2	Source of Hazard			x	Live hand grenade court
	3	Location of Munitions			x	Suspected historical evidence
	4	Ease of Access			x	No barrier
	5	Status of Property			x	Non-DoD control
	6	Population Density			x	<100 persons per square mile
	7	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	8	Activities/Structures			x	Agricultural - livestock grazing
	9	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	10	**EHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Chemical Warfare Materiel (CWM) Hazard Evaluation (CHE)	11	CWM Configuration			x	Historical evidence indicates that CWM are not present
	12	Sources of CWM			x	Historical evidence indicates that CWM are not present
	13	Location of CWM			x	Historical evidence indicates that CWM are not present
	14	Ease of Access			x	No barrier
	15	Status of Property			x	Non-DoD control
	16	Population Density			x	<100 persons per square mile
	17	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	18	Activities/Structures			x	Agricultural - livestock grazing
	19	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	20	**CHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Health Hazard Evaluation (HHE)	21	HHE Factor Levels	x	Contaminant hazard evaluation pending analytical results		
	22	HHE Three-Letter Combination Levels	x	Contaminant hazard evaluation pending analytical results		
	23	HHE Module Ratings	x	Contaminant hazard evaluation pending analytical results		
	24	HHE Module Rating	x	Contaminant hazard evaluation pending analytical results		
MRS Priority	**25**	**MRS Priority (Based on Highest Hazard Evaluation Module Rating)**	**x**	**Evaluation pending filling of data gaps**		

To be completed by USACE once all data gaps are filled.

Munitions Response Site Prioritization Protocol (MRSPP) Data Gaps
32 CRF Part 179

Installation: Camp Adair
AOC: Live Hand Grenade Court No. 129
RMIS Range ID: F10OR0029

Module	Table No.	Table Description	Data Gap	Potential Source of Information to Fill Data Gap	No Data Gap	Description of Known Data
Explosive Hazard Evaluation (EHE)	1	Munitions Type			x	Mk II hand grenade, M21 practice hand grenade
	2	Source of Hazard			x	Live hand grenade court
	3	Location of Munitions			x	Suspected historical evidence
	4	Ease of Access			x	No barrier
	5	Status of Property			x	Non-DoD control
	6	Population Density			x	<100 persons per square mile
	7	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	8	Activities/Structures			x	Agricultural - livestock grazing
	9	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	10	**EHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Chemical Warfare Materiel (CWM) Hazard Evaluation (CHE)	11	CWM Configuration			x	Historical evidence indicates that CWM are not present
	12	Sources of CWM			x	Historical evidence indicates that CWM are not present
	13	Location of CWM			x	Historical evidence indicates that CWM are not present
	14	Ease of Access			x	No barrier
	15	Status of Property			x	Non-DoD control
	16	Population Density			x	<100 persons per square mile
	17	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	18	Activities/Structures			x	Agricultural - livestock grazing
	19	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	20	**CHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Health Hazard Evaluation (HHE)	21	HHE Factor Levels	x	Contaminant hazard evaluation pending analytical results		
	22	HHE Three-Letter Combination Levels	x	Contaminant hazard evaluation pending analytical results		
	23	HHE Module Ratings	x	Contaminant hazard evaluation pending analytical results		
	24	HHE Module Rating	x	Contaminant hazard evaluation pending analytical results		
MRS Priority	**25**	**MRS Priority (Based on Highest Hazard Evaluation Module Rating)**	**x**	**Evaluation pending filling of data gaps**		

To be completed by USACE once all data gaps are filled.

Munitions Response Site Prioritization Protocol (MRSPP) Data Gaps
32 CRF Part 179

Installation: Camp Adair
AOC: Bombing Target No. 1
RMIS Range ID: F10OR0029

Module	Table No.	Table Description	Data Gap	Potential Source of Information to Fill Data Gap	No Data Gap	Description of Known Data
Explosive Hazard Evaluation (EHE)	1	Munitions Type			x	105mm, 155mm, 100-, 500-lb bombs
	2	Source of Hazard			x	Bombing, gunnery, artillery ranges
	3	Location of Munitions			x	Suspected historical evidence
	4	Ease of Access			x	No barrier
	5	Status of Property			x	Non-DoD control
	6	Population Density			x	<100 persons per square mile
	7	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	8	Activities/Structures			x	Agricultural - livestock grazing
	9	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	10	**EHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Chemical Warfare Materiel (CWM) Hazard Evaluation (CHE)	11	CWM Configuration			x	Historical evidence indicates that CWM are not present
	12	Sources of CWM			x	Historical evidence indicates that CWM are not present
	13	Location of CWM			x	Historical evidence indicates that CWM are not present
	14	Ease of Access			x	No barrier
	15	Status of Property			x	Non-DoD control
	16	Population Density			x	<100 persons per square mile
	17	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	18	Activities/Structures			x	Agricultural - livestock grazing
	19	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	20	**CHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Health Hazard Evaluation (HHE)	21	HHE Factor Levels	x	Contaminant hazard evaluation pending analytical results		
	22	HHE Three-Letter Combination Levels	x	Contaminant hazard evaluation pending analytical results		
	23	HHE Module Ratings	x	Contaminant hazard evaluation pending analytical results		
	24	HHE Module Rating	x	Contaminant hazard evaluation pending analytical results		
MRS Priority	**25**	**MRS Priority (Based on Highest Hazard Evaluation Module Rating)**	**x**	**Evaluation pending filling of data gaps**		

To be completed by USACE once all data gaps are filled.

Munitions Response Site Prioritization Protocol (MRSPP) Data Gaps
32 CRF Part 179

Installation: Camp Adair
AOC: Mortar Range
RMIS Range ID: F10OR0029

Module	Table No.	Table Description	Data Gap	Potential Source of Information to Fill Data Gap	No Data Gap	Description of Known Data
Explosive Hazard Evaluation (EHE)	1	Munitions Type			x	Small arms; 60mm, 81mm mortars
	2	Source of Hazard			x	Mortar, small arms range
	3	Location of Munitions			x	Suspected historical evidence
	4	Ease of Access			x	No barrier
	5	Status of Property			x	Non-DoD control
	6	Population Density			x	<100 persons per square mile
	7	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	8	Activities/Structures			x	Agricultural - livestock grazing
	9	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	10	**EHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Chemical Warfare Materiel (CWM) Hazard Evaluation (CHE)	11	CWM Configuration			x	Historical evidence indicates that CWM are not present
	12	Sources of CWM			x	Historical evidence indicates that CWM are not present
	13	Location of CWM			x	Historical evidence indicates that CWM are not present
	14	Ease of Access			x	No barrier
	15	Status of Property			x	Non-DoD control
	16	Population Density			x	<100 persons per square mile
	17	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	18	Activities/Structures			x	Agricultural - livestock grazing
	19	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	20	**CHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Health Hazard Evaluation (HHE)	21	HHE Factor Levels	x	Contaminant hazard evaluation pending analytical results		
	22	HHE Three-Letter Combination Levels	x	Contaminant hazard evaluation pending analytical results		
	23	HHE Module Ratings	x	Contaminant hazard evaluation pending analytical results		
	24	HHE Module Rating	x	Contaminant hazard evaluation pending analytical results		
MRS Priority	**25**	**MRS Priority (Based on Highest Hazard Evaluation Module Rating)**	**x**	**Evaluation pending filling of data gaps**		

To be completed by USACE once all data gaps are filled.

Munitions Response Site Prioritization Protocol (MRSPP) Data Gaps
32 CRF Part 179

Installation: Camp Adair
AOC: Moving Target Range No. 75
RMIS Range ID: F10OR0029

Module	Table No.	Table Description	Data Gap	Potential Source of Information to Fill Data Gap	No Data Gap	Description of Known Data
Explosive Hazard Evaluation (EHE)	1	Munitions Type			x	75mm projectiles, 37mm projectiles
	2	Source of Hazard			x	Arterillery Range
	3	Location of Munitions			x	Suspected historical evidence
	4	Ease of Access			x	No barrier
	5	Status of Property			x	Non-DoD control
	6	Population Density			x	<100 persons per square mile
	7	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	8	Activities/Structures			x	Agricultural - livestock grazing
	9	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	10	**EHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Chemical Warfare Materiel (CWM) Hazard Evaluation (CHE)	11	CWM Configuration			x	Historical evidence indicates that CWM are not present
	12	Sources of CWM			x	Historical evidence indicates that CWM are not present
	13	Location of CWM			x	Historical evidence indicates that CWM are not present
	14	Ease of Access			x	No barrier
	15	Status of Property			x	Non-DoD control
	16	Population Density			x	<100 persons per square mile
	17	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	18	Activities/Structures			x	Agricultural - livestock grazing
	19	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	20	**CHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Health Hazard Evaluation (HHE)	21	HHE Factor Levels	x	Contaminant hazard evaluation pending analytical results		
	22	HHE Three-Letter Combination Levels	x	Contaminant hazard evaluation pending analytical results		
	23	HHE Module Ratings	x	Contaminant hazard evaluation pending analytical results		
	24	HHE Module Rating	x	Contaminant hazard evaluation pending analytical results		
MRS Priority	**25**	**MRS Priority (Based on Highest Hazard Evaluation Module Rating)**	**x**	**Evaluation pending filling of data gaps**		

To be completed by USACE once all data gaps are filled.

Munitions Response Site Prioritization Protocol (MRSPP) Data Gaps
32 CRF Part 179

Installation: Camp Adair
AOC: Range Complex No. 1
RMIS Range ID: F10OR0029

Module	Table No.	Table Description	Data Gap	Potential Source of Information to Fill Data Gap	No Data Gap	Description of Known Data
Explosive Hazard Evaluation (EHE)	1	Munitions Type			x	Light and heavy arms (.30 to .50 caliber); 105mm, 155mm howitzers; mortars; 2.35-in anti-tank, practice rockets; 100-, 300-, 500-lb bombs; explosives; blasting caps; incendiary, illumination, smoke devices
	2	Source of Hazard			x	Bombing, gunnery, artillery range
	3	Location of Munitions			x	Suspected historical evidence
	4	Ease of Access			x	No barrier
	5	Status of Property			x	Non-DoD control
	6	Population Density			x	<100 persons per square mile
	7	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	8	Activities/Structures			x	Agricultural - livestock grazing
	9	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	10	**EHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Chemical Warfare Materiel (CWM) Hazard Evaluation (CHE)	11	CWM Configuration			x	Historical evidence indicates that CWM are not present
	12	Sources of CWM			x	Historical evidence indicates that CWM are not present
	13	Location of CWM			x	Historical evidence indicates that CWM are not present
	14	Ease of Access			x	No barrier
	15	Status of Property			x	Non-DoD control
	16	Population Density			x	<100 persons per square mile
	17	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	18	Activities/Structures			x	Agricultural - livestock grazing
	19	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	20	**CHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Health Hazard Evaluation (HHE)	21	HHE Factor Levels	x	Contaminant hazard evaluation pending analytical results		
	22	HHE Three-Letter Combination Levels	x	Contaminant hazard evaluation pending analytical results		
	23	HHE Module Ratings	x	Contaminant hazard evaluation pending analytical results		
	24	HHE Module Rating	x	Contaminant hazard evaluation pending analytical results		
MRS Priority	**25**	**MRS Priority (Based on Highest Hazard Evaluation Module Rating)**	**x**	**Evaluation pending filling of data gaps**		

To be completed by USACE once all data gaps are filled.

Munitions Response Site Prioritization Protocol (MRSPP) Data Gaps
32 CRF Part 179

Installation: Camp Adair
AOC: Range Complex No. 2
RMIS Range ID: F10OR0029

Module	Table No.	Table Description	Data Gap	Potential Source of Information to Fill Data Gap	No Data Gap	Description of Known Data
Explosive Hazard Evaluation (EHE)	1	Munitions Type			x	Light and heavy arms (.30 to .50 caliber); 105mm, 155mm howitzers; mortars; 2.35-in anti-tank, practice rockets; 100-, 300-, 500-lb bombs; explosives; blasting caps; incendiary, illumination, smoke devices
	2	Source of Hazard			x	Bombing, gunnery, artillery range
	3	Location of Munitions			x	Suspected historical evidence
	4	Ease of Access			x	No barrier
	5	Status of Property			x	Non-DoD control
	6	Population Density			x	<100 persons per square mile
	7	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	8	Activities/Structures			x	Agricultural - livestock grazing
	9	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	10	**EHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Chemical Warfare Materiel (CWM) Hazard Evaluation (CHE)	11	CWM Configuration			x	Historical evidence indicates that CWM are not present
	12	Sources of CWM			x	Historical evidence indicates that CWM are not present
	13	Location of CWM			x	Historical evidence indicates that CWM are not present
	14	Ease of Access			x	No barrier
	15	Status of Property			x	Non-DoD control
	16	Population Density			x	<100 persons per square mile
	17	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	18	Activities/Structures			x	Agricultural - livestock grazing
	19	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	20	**CHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Health Hazard Evaluation (HHE)	21	HHE Factor Levels	x	Contaminant hazard evaluation pending analytical results		
	22	HHE Three-Letter Combination Levels	x	Contaminant hazard evaluation pending analytical results		
	23	HHE Module Ratings	x	Contaminant hazard evaluation pending analytical results		
	24	HHE Module Rating	x	Contaminant hazard evaluation pending analytical results		
MRS Priority	**25**	**MRS Priority (Based on Highest Hazard Evaluation Module Rating)**	**x**	**Evaluation pending filling of data gaps**		
	To be completed by USACE once all data gaps are filled.					

Munitions Response Site Prioritization Protocol (MRSPP) Data Gaps
32 CRF Part 179

Installation: Camp Adair
AOC: Range Complex No. 3
RMIS Range ID: F10OR0029

Module	Table No.	Table Description	Data Gap	Potential Source of Information to Fill Data Gap	No Data Gap	Description of Known Data
Explosive Hazard Evaluation (EHE)	1	Munitions Type			x	Small arms, .50 caliber machine gun; 105mm, 155mm, 37mm, 57mm projectiles; 60mm, 81mm mortars
	2	Source of Hazard			x	Gunnery, artillery range
	3	Location of Munitions			x	Suspected historical evidence
	4	Ease of Access			x	No barrier
	5	Status of Property			x	Non-DoD control
	6	Population Density			x	<100 persons per square mile
	7	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	8	Activities/Structures			x	Agricultural - livestock grazing
	9	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	10	**EHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Chemical Warfare Materiel (CWM) Hazard Evaluation (CHE)	11	CWM Configuration			x	Historical evidence indicates that CWM are not present
	12	Sources of CWM			x	Historical evidence indicates that CWM are not present
	13	Location of CWM			x	Historical evidence indicates that CWM are not present
	14	Ease of Access			x	No barrier
	15	Status of Property			x	Non-DoD control
	16	Population Density			x	<100 persons per square mile
	17	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	18	Activities/Structures			x	Agricultural - livestock grazing
	19	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	20	**CHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Health Hazard Evaluation (HHE)	21	HHE Factor Levels	x	Contaminant hazard evaluation pending analytical results		
	22	HHE Three-Letter Combination Levels	x	Contaminant hazard evaluation pending analytical results		
	23	HHE Module Ratings	x	Contaminant hazard evaluation pending analytical results		
	24	HHE Module Rating	x	Contaminant hazard evaluation pending analytical results		
MRS Priority	**25**	**MRS Priority (Based on Highest Hazard Evaluation Module Rating)**	**x**	**Evaluation pending filling of data gaps**		

To be completed by USACE once all data gaps are filled.

Munitions Response Site Prioritization Protocol (MRSPP) Data Gaps
32 CRF Part 179

Installation: Camp Adair
AOC: Range Complex No. 4
RMIS Range ID: F10OR0029

Module	Table No.	Table Description	Data Gap	Potential Source of Information to Fill Data Gap	No Data Gap	Description of Known Data
Explosive Hazard Evaluation (EHE)	1	Munitions Type	x	Reconnaissance of area		small arms (.22 to .50 caliber), dynamite, TNT
	2	Source of Hazard			x	Former small arms range
	3	Location of Munitions			x	Suspected historical evidence
	4	Ease of Access			x	No barrier
	5	Status of Property			x	Non-DoD control
	6	Population Density			x	<100 persons per square mile
	7	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	8	Activities/Structures			x	Agricultural - livestock grazing
	9	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	10	**EHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Chemical Warfare Materiel (CWM) Hazard Evaluation (CHE)	11	CWM Configuration			x	Historical evidence indicates that CWM are not present
	12	Sources of CWM			x	Historical evidence indicates that CWM are not present
	13	Location of CWM			x	Historical evidence indicates that CWM are not present
	14	Ease of Access			x	No barrier
	15	Status of Property			x	Non-DoD control
	16	Population Density			x	<100 persons per square mile
	17	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	18	Activities/Structures			x	Agricultural - livestock grazing
	19	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	20	**CHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Health Hazard Evaluation (HHE)	21	HHE Factor Levels	x	Contaminant hazard evaluation pending analytical results		
	22	HHE Three-Letter Combination Levels	x	Contaminant hazard evaluation pending analytical results		
	23	HHE Module Ratings	x	Contaminant hazard evaluation pending analytical results		
	24	HHE Module Rating	x	Contaminant hazard evaluation pending analytical results		
MRS Priority	**25**	**MRS Priority (Based on Highest Hazard Evaluation Module Rating)**	**x**	**Evaluation pending filling of data gaps**		

To be completed by USACE once all data gaps are filled.

Munitions Response Site Prioritization Protocol (MRSPP) Data Gaps
32 CRF Part 179

Installation: Camp Adair
AOC: Range Complex No. 5
RMIS Range ID: F10OR0029

Module	Table No.	Table Description	Data Gap	Potential Source of Information to Fill Data Gap	No Data Gap	Description of Known Data
Explosive Hazard Evaluation (EHE)	1	Munitions Type	x	Reconnaissance of area		small arms (.22 to .50 caliber)
	2	Source of Hazard			x	Former small arms range
	3	Location of Munitions			x	Suspected historical evidence
	4	Ease of Access			x	No barrier
	5	Status of Property			x	Non-DoD control
	6	Population Density			x	<100 persons per square mile
	7	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	8	Activities/Structures			x	Agricultural - livestock grazing
	9	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	10	**EHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Chemical Warfare Materiel (CWM) Hazard Evaluation (CHE)	11	CWM Configuration			x	Historical evidence indicates that CWM are not present
	12	Sources of CWM			x	Historical evidence indicates that CWM are not present
	13	Location of CWM			x	Historical evidence indicates that CWM are not present
	14	Ease of Access			x	No barrier
	15	Status of Property			x	Non-DoD control
	16	Population Density			x	<100 persons per square mile
	17	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	18	Activities/Structures			x	Agricultural - livestock grazing
	19	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	20	**CHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Health Hazard Evaluation (HHE)	21	HHE Factor Levels	x	Contaminant hazard evaluation pending analytical results		
	22	HHE Three-Letter Combination Levels	x	Contaminant hazard evaluation pending analytical results		
	23	HHE Module Ratings	x	Contaminant hazard evaluation pending analytical results		
	24	HHE Module Rating	x	Contaminant hazard evaluation pending analytical results		
MRS Priority	**25**	**MRS Priority (Based on Highest Hazard Evaluation Module Rating)**	**x**	**Evaluation pending filling of data gaps**		

To be completed by USACE once all data gaps are filled.

Munitions Response Site Prioritization Protocol (MRSPP) Data Gaps
32 CRF Part 179

Installation: Camp Adair
AOC: Range Complex No. 6
RMIS Range ID: F10OR0029

Module	Table No.	Table Description	Data Gap	Potential Source of Information to Fill Data Gap	No Data Gap	Description of Known Data
Explosive Hazard Evaluation (EHE)	1	Munitions Type	x	Reconnaissance of area		small arms (.22 to .50 caliber)
	2	Source of Hazard			x	Former small arms range
	3	Location of Munitions			x	Suspected historical evidence
	4	Ease of Access			x	No barrier
	5	Status of Property			x	Non-DoD control
	6	Population Density			x	<100 persons per square mile
	7	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	8	Activities/Structures			x	Agricultural - livestock grazing
	9	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	10	**EHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Chemical Warfare Materiel (CWM) Hazard Evaluation (CHE)	11	CWM Configuration			x	Historical evidence indicates that CWM are not present
	12	Sources of CWM			x	Historical evidence indicates that CWM are not present
	13	Location of CWM			x	Historical evidence indicates that CWM are not present
	14	Ease of Access			x	No barrier
	15	Status of Property			x	Non-DoD control
	16	Population Density			x	<100 persons per square mile
	17	Population Near Hazard	x	0 inhabited structures w/in 2 miles		
	18	Activities/Structures			x	Agricultural - livestock grazing
	19	Ecological and/or Cultural Resources	x	State Historical Preservation Office		
	20	**CHE Module Score**	**x**	**Evaluation pending filling of data gaps**		
Health Hazard Evaluation (HHE)	21	HHE Factor Levels	x	Contaminant hazard evaluation pending analytical results		
	22	HHE Three-Letter Combination Levels	x	Contaminant hazard evaluation pending analytical results		
	23	HHE Module Ratings	x	Contaminant hazard evaluation pending analytical results		
	24	HHE Module Rating	x	Contaminant hazard evaluation pending analytical results		
MRS Priority	**25**	**MRS Priority (Based on Highest Hazard Evaluation Module Rating)**	**x**	**Evaluation pending filling of data gaps**		

To be completed by USACE once all data gaps are filled.

Camp Adair HRS Data Gaps

Information required to complete the MEC-HRS data collection form:

Item	Number	Comment – Missing Data Element
1	1.8	Confirm the latitude / longitude of potential source(s) and the accuracy of the information (in meters)
2		Source scale (i.e., 1:24,000, etc.)
3	1.12	Site Permits
4	2.4	Confirm if there are other NPL sites within 1 mile of the site
5	5.3	Population within 1 mile, within 4 miles
6	6	Water use (GW within 4 miles, SW within 15 miles)
7	6.1	Total drinking water population served
8	6.2	Type of drinking water supply system (GW or SW?)
9	6.3	Other water uses of GW within 4 miles
10	6.5	Surface water uses
11	6.6	Type of SW adjacent to (within 2 miles) of the site
12	8.1	Types of action(s) that have occurred at or near the site
13	8.2	Who did the action? (EPA, Private parties, other, etc.?)